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Annual List of Periodicals

U.S. ENVIRONMENTAL PROTECTION AGENCY

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDE PROGRAMS
PROGRAM SUPPORT DIVISION
Rm. EB-49, 401 M Street. S.W.
Washington, D.C. 20460

PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

Publication of an abstract, annotation, or citation does not imply endorsement by the Environmental Protection Agency of the original article or of commercial materials, equipment, or processes mentioned therin.

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Preface

Included in this issue is a list of sources from which at least one article was abstracted for publication in either Volume 10 (1977) or Volume 11 (1978); however, more than 2500 primary serials and secondary sources, books, and non-periodical publications are screened. Journal titles are abbreviated according to the format of the *Bibliographic Guide for Editors and Authors*, available from Chemical Abstracts Service. Japanese publications are listed by the Hepburn romanization of the complete title. For additional convenience, English titles of Japanese periodicals are listed separately and cross-referenced.

ACS SYMP SER
ACTA AGRAR SILVESTRIA SER AGRAR
ACTA AGROBOT
ACTA AGRON ACAD SCI HUNG
ACTA ALIMENT
ACTA BIOL CRACOVIENSIA
ACTA BIOL MED GER
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ACTA MICROBIOL ACAD SCI HUNG
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ACTA PHYTOPATHOL ACAD SCI HUNG
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ADV ECOL RES
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AEROSP MED
AFINIDAD
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    SEE AKITA-KEN NOSON IGAKKAI ZASSHI
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ALIMENT VIE
AM BEE J
AM IND HYG ASSOC J
AM J EPIDEMIOL
AM J PHYSIOL
AM J PUBLIC HEALTH
AM J VET RES
AMBIO
AN EDAFOL AGROBIOL
AN INST CERCET PROT PLANT
AN QUIM
ANAL BIOCHEM
ANAL CHEM
ANAL CHIM ACTA
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ANNU REV MICROBIOL
ANZ SCHAEDLINGSKD PFLANZENSCH
APPL ENVIRON MICROBIOL
APPL PHARMACOL
    SEE OYO YAKURI
APPL SPECTROSC
AQUACULTURE
ARCH ANAT MICROSC MORPHOL
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CAH NUTR DIET
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CAN VET J
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DOPOV AKAD NAUK UKR RSR SER B
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ECOL LAW QUART
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EUR J TOXICOL ENVIRON HYG
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EXP CELL BIOL
EXP EYE RES
EXP NEUROL
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FARMATSIYA (MOSCOW)
FEBS LETT
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FEGATO
FERTIL STERIL
FIN VETERINAERTIDSKR
FIRE ENG
FISH BULL
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FIZIOL RAST
FIZIOL ZH SSSR
FLA GROW RANCHER
FLEISCHWIRTSCHAFT
FOLIA HISTOCHEM CYTOCHEM
FOLIA MORPHOL (PRAGUE)
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GEODERMA
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GETREIDE MEHL BROT
GIDROBIOL ZH
GIG SANIT
GIG TR PROF ZABOL
GRASAS ACEITES
    SEE FATS AND OILS
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HERCYNIA
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HISTOPATHOLOGY
HOLZFORSCHUNG
HOSP PRACT
HYDROBIOL BULL
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IN VITRO
IND HEALTH
INDIAN CHEM J
INDIAN J AGRIC SCI
INDIAN J ANIM SCI
INDIAN J BIOCHEM BIOPHYS
INDIAN J CHEM
INDIAN J ENVIRON BIOL
INDIAN J ENVIRON HEALTH
INDIAN J EXP BIOL
INDIAN J MED RES
INDIAN J PHYSIOL PHARMACOL
INDIAN VET J

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INT J APPL RADIAT ISOT
INT J CHRONOBIOL
INT J ENVIRON ANAL CHEM
INT J ENVIRON STUD
INT MED INFANTS
    SEE SHONI NAIKNAIKA
INT PEST CONTROL
INTENSIVMEDIZIN
INTERNIST
INVEST FISH CONTROL
IR J MED SCI
ISR J MED SCI
ISR J ZOOL
IZV AKAD NAUK KAZ SST SER BIOL
IZV AKAD NAUK SSSR SER BIOL
IZV AKAD NAUK SSSR SER KHIM
IZV AKAD NAUK USSR SER BIOL
J AGRIC BACTERIOL
J AGRIC CHEM SOC JPN
    SEE NIPPON NOGEI KAGAKU
        KAISHI
J AGRIC FOOD CHEM
J AGRIC SCI
J AM MED ASSOC
J AM OIL CHEM SOC
J AM SOC HORTIC SCI
J AM VET MED ASSOC
J AM WATER WORKS ASSOC
J ANAL TOXICOL
J ANIM SCI
J APIC RES
J APPL ECOL
J APPL MED
J APPL METEOROL
J AQUA PLANT MANAGE
J ASSOC OFF ANAL CHEM
J AUST ENTOMOL SOC
J BIOL CHEM
J CHEM EDUC
J CHIN AGRIC CHEM SOC
    SEE CHANG-KUO NONG YEA HUA
J CHIN CHEM SOC
J CHROMATOGR
J CHROMATOGR SCI
J CLIN CHEM CLIN BIOCHEM
J CLIN ENDOCRINOL METAB
J COLL SCI TEACH
J DAIRY SCI
J ECON ENTOMOL
J ENTOMOL RES
J ENVIRON ENG DIV
J ENVIRON HEALTH
J ENVIRON PATHOL TOXICOL
J ENVIRON POLLUTION CONTROL
    SEE KOGAI TO TAISAKU
J ENVIRON QUAL
J ENVIRON SCI HEALTH A
J ENVIRON SCI HEALTH B
J ENVIRON SCI HEALTH C
J EUR TOXICOL
J EVOL BIOCHEM PHYSIOL
J FERMENT TECHNOL
J FISH BIOL
J FISH RES BOARD CAN
J FOOD HYG SOC JPN
    SEE SHOKUHIN EISEIGAKU ZASSHI
J FOOD PROT
J FOOD SCI
J HYG CHEM
    SEE EISEI KAGAKU
J HYG EPIDEMIOL MICROBIOL IMMUN
J IA MED SOC
J INDIAN ACAD FORENSIC SCI
J INDIAN CHEM SOC
J IR MED ASSOC
J JPN ASSOC RURAL MED
    SEE NIPPON NOSON IGAKKAI
        ZASSHI
J MAMMAL
J MAR RES
J MED ASSOC OKAYAMA
    SEE OKAYANAYAMA IGAKKAI
        ZASSHI
J MED MONTPELLIER
J MED SOC NJ
J MISS ACAD SCI
J N Y ENTOMOL SOC
J NAGOYA CITY UNIV MED SCH
    SEE NAGOYA SHIRITSU DAIGAKU
J NERV MENT DIS
J NUTR
J NUTR
    SEE RINSHO EIYO
J OCCUP MED

J PEDIATR
J PESTIC SCI
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J PHARMACOL EXP THER
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J PHYSIOL (PARIS)
J PROTOZOOLOGY
J RADIOANAL CHEM
J RANGE MANAGE
J RETICULOENDOTHELIAL SOC
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J SOC INT MED
    SEE NIPPON NAIKAGAKKAI
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J SOIL SCI
J SUPRAMOL STRUCT
J TEXT INST
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JPN ANALYST
    SEE BUNSEKI KAGAKU
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    SEE RINSHO HIFUKA
JPN J ECOL
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N Z MED J
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    SEE NAGASAKI-KEN EISEI KOGAI KENKY
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POL J PHARMACOL PHARM
POL TECH REV
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PRAC LEK
PRIRODOVED PR USTAVU CESK AKAD
PROBL ENDOKRINOL (MOSCOW)
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TOXICON
TR GOS OKEANOGR INST
TR VSES NAUCHNO-ISSLED INST VET
TRACE SUBST ENVIRON HEALTH
TRANS AM FISH SOC
TRANS AM NEUROL ASSOC
TRANS ASAE
TRANS BR MYCOL SOC
TRANS ILL ACAD SCI
TRANS N AM WILDL NAT RES
TRAV CHIM ALIMENT HYG
TRAV SOC PHARM MONTPELLIER
TROP GEOGR MED
UKR BIOKHIM ZH
UKR KHIM ZH
UMSCHAU
UNION MED CAN
UNIV MICROFILMS INT
UROLOGY
US FISH WILD SERV INVEST FISH C
USP SOVREM BIOL
UZB BIOL ZH
VAR FOEDA
VESTN DERMATOL VENEROL
VESTN OTORINOLARINGOL
VESTN SKH NAUKI (MOSCOW)
VESTSI AKAD NAVUK BSSR SER BIV
VET HUM TOXICOL
VET MED (PRAGUE)
VET REC
VET-MED NAUKI
VETERINARIYA (MOSCOW)
VISN SIL'S'KOGOSPOD NAUKI
VOPR MED KHIM
VOPR ONKOL
VOPR PITAN
VRACH DELO
WASTE AGE
WASTEWATER ENG
WATER & SEWAGE WORKS
WATER AIR SOIL POLLUT
WATER RES
WATER RESOUR BULL
WEED RES
WEED SCI
WEST J MED
WHITE PAPER ON ENVIRON POLLUT
    SEE KOGAI HAKUSHO
WHO TECH REP SER
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Z VERSUCHSTIERK
Z WASSER ABWASSER FORSCH
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ZH ANAL KHIM
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ZH VSES O-VA
ZHIVOTNOVUD NAUKI
ZOOL POL
ZOOL Z (MOSCOW)
ZUCKERINDUSTRIE

79-0001. Gitlitz, M. H. (M&T Chem. Inc., Rahway, NJ 07065) **Organotins in agriculture.** *Adv. Chem. Ser.* 157: 167-176; 1978. (49 references)

Organotin compounds have recently become commercially important as fungicides and insecticides. Knowledge of structural relationships to biological activity and environmental degradation is limited. Recent studies using organotin compounds are discussed. Studies indicate that steric effects seem to be important in determining the degree of the compound's toxicity. Organotin compounds appear to be no more toxic than many common commercial and laboratory chemicals. The degradation processes result in the formation of non-toxic inorganic tin, however phytotoxicity is an important factor resulting from the breakdown. Persistance in the environment is not a problem. General properties of organotin compounds are discussed. [At the 171st Mtg. of the American Chemical Society.]

79-0002. Robinson, A. S. (Assoc. EURATOM-ITAL, Wageningen, The Netherlands) **Progress in the use of chromosomal translocations for the control of insect pests.** *Biol. Rev. Cambridge Philos. Soc.* 51(1): 1-24; 1976. (131 references)

The investigation of genetic methods of insect control has expanded rapidly following the success of the method of releasing sterile insects in controlling the screw-worm fly in the southwestern United States. Control of insect pests by the use of chromosomal translocations requires a detailed knowledge of the ecology of the target species. It is also advantageous to know something about the genetics of the target species. Segregation of aneuploid gametes from translocation heterozygotes leads to a reduction in fertility. Reduced fertility is inherited by half the progeny of translocation heterozygotes in crosses with normal individuals. Theoretically, translocations could function in insect control by exerting a genetic load, *i.e.*, by causing the death of zygotes in natural populations. They could also function by acting as a transport system for incorporation of particular genes. Small scale experiments with *Culex pipiens* and *Musca domestica* have indicated the potential utility of this method.

79-0003. Anonymous **AIBS Report: Aquatic hazard evaluation of chemical pesticides.** *BioScience* 28(9): 600-601; 1978. (2 references)

The Aquatic Hazards Task Group of the American Institute of Biological Sciences was charged by the EPA with developing criteria to determine the need for additional aquatic hazard testing of pesticides and suggesting a reasonable test sequence. The principal criteria indicating a need for further testing include the LC50, estimated environmental concentration, extent of use, water solubility, half-life in water, and unusual low-dose effects. The basic data for pesticide registration should always include an estimate of the maximum acceptable toxicant concentration for the most sensitive life stage of an aquatic organism. Conditional tests which may be advisable fall into three categories: toxicity, bioconcentration and field tests.

79-0004. Nigg, H. N. (Univ. Florida Agric. Res. Educ. Cent., Lake Alfred, FL 33850) **Federal interest in pesticide illnesses of farmworkers in Florida.** *Citrus Ind.* 59(7): 17, 18, 21, 24; 1978.

In order to keep Florida citrus growers and the public better informed about information requested by Federal officials from Florida research scientists, a series of written questions and answers were published. Only one incident of harvester illness in Florida is known to the author; in this incident ten workers became ill either after being sprayed from the air or as a result of reentering a cornfield immediately after spraying. When acute applicator illnesses have occurred, application practices have been changed to prevent recurrences. Dermatitis problems still occur, but are due to many causes. Pesticide illnesses in Florida are reported via the Workman's Compensation system. However, the reporting may not be accurate because many workers are not familiar with this system. Instead of enacting compliance testing and monitoring legislation, it is recommended that the Federal government conduct additional studies on residue degradation and human exposure conditions.

79-0005. Hoffmann, O. L. (Crop Prot. Prod., Gulf Oil Chem. Co., Merriam, KS 66202) **Herbicide antidoes: concept to crop.** *Chemtech* 8(8): 488-492; 1978. (21 references)

Research conducted in the field of herbicide antidotes over the past 21 years is examined in light of the potential of these antidotes to control weeds closely related to the desired crop, weedy corn in a seed corn field, shattercane in a grain sorghum field, red rice in a rice field, and wild oats in an oat field. Such chemicals permit the production of an economic crop of a given plant while controlling an unwanted type plant of the same genus, species and variety. The discovery of the antagonistic relationship of 2,4,6-T and 2,4-D, along with the neutralization of the herbicidal action of barban by 2,4-D are seen as highlights in the development of herbicide antidotes. It is now known that trifluralin formulations can be antidotes on corn in Petri plate tests, but tests in actual soil were disappointing. Oxidation-reduction compounds can be used to antidote paraquat, when both paraquat and the antidoting chemical are applied as sprays. Success thus far has been limited to herbicides which work on one specific photosystem, while others such as diuron which act by means of a second photosystem, show as yet no promise.

79-0006. Rosival, L.; Jager, K. W. (Res. Inst. Hyg., Bratislava, CSSR) **Evaluation of various existing classifications of toxicity and hazard, as far as relevant for occupational exposure to pesticides. Report of an international workshop.** *Int. Arch. Occup. Eviron. Health* 41(4): 287-290; 1978. (2 references)

Recommendations from participants in the ILO and WHO Workshop on Occupational Exposure to Pesticides and Resulting Toxic Effects are presented. The first recommendation was that the WHO classification be considered the most relevant international guideline for use in occupational exposure at the present time. Hazards must be considered in

relation to the level of training of the applicators and the expected benefits. Thus, a classification scheme cannot be used to replace the risk-benefit assessment. Clear characterizations of technical material used for determining toxicological indices must be made. Research is needed in developing methods for assessment of worker exposure. Field studies must be coordinated to give comparable results so that scientifically sound advice may be based on the studies. An intensification of training and education in the safe use of pesticides must be forthcoming at all levels of exposure. Cooperation between the ILO and WHO should be increased in these areas of study. A review of the available data in the field of special hazards associated with pesticide application was requested.

79-0007. Nisbet, I. C. T. (Author address not given) **A poor harvest for pesticide regulation.** *Environment* 80(8): 10-11; 1978.

Although the 1972 amendments to FIFRA (the Federal Insecticide, Fungicide and Rodenticide Act) required review and reregistration of all existing pesticides within two years, not one of the 33,000 registered pesticides has yet been given new approval. The multifarious reasons for the delay in this process as well as for the delay in registering new pesticides are outlined. The extensive testing now required prior to marketing new pesticides has favored continued use of existing products, despite the lack of complete information on their effects. The result is a delay by at least five years in the intent of FIFRA to replace the hazardous pesticides already in use with safer new products. The road to resolution of the problem of contradictory instructions received by EPA from Congress is uncertain. Some assistance might be offered by shifting the burden for more detailed testing back to industry.

79-0008. Service, M. W. (Dep. Med. Entomol., Liverpool Sch. Trop. Med., Liverpool, England) **The blackfly dilemma: a reply.** *Environ. Conserv.* 5(1): 65; 1978. (4 references)

In response to a paper reporting reinvasion of the blackfly (*Simulium damnosum*) complex into areas of West Africa where the vector had once been eradicated, it is stated that limited reinvasion is neither unexpected nor indicative of failure in a large scale control scheme. Alternative measures to insecticide spraying for black fly control are being investigated, although such efforts are impeded by the inability to establish laboratory colonies of *S. damnosum.* The effects of the currently used insecticide, Abate (temophos) on non-target aquatic organisms are under investigation. It is difficult to monitor the side effects of temophos application due to the vastness of the area covered. It is acknowledged that control of river blindness by drugs is desirable; however pharmaceutical companies are reluctant to invest in expensive searches for new drugs for an extremely limited market which would not reimburse them for the development costs. This is also true of the development of insecticides specifically active against black flies.

79-0009. Mukherjee, R. N. (Author address not given) **Comparative biological hazards of chemical pollutants and radiation.** *IAEA Bull.* 20(3): 31-38; 1978. (6 references)

The production of synthetic organic chemicals for use in the agricultural industry has increased from 8 million lbs. in 1938 to 1,013 million lbs. in 1966 and is estimated to increase by 1980 to 6,350 million lbs. per year. Residues of these synthetic chemicals are present in increasing amounts in the environment and are carried through the hemispheres with wind and ocean currents to areas where they were never originally released. The pollution thus caused is a global problem. Steps for controlling this problem are briefly reviewed. Research had identified various chemical pollutants and evaluated their carcinogenic and mutagenic effects at various levels of exposure. Such investigations have been sponsored by national and regional scientific societies and coordinated by such groups as the International Association for Environmental Health Sciences. The establishment of an International Commission on Protection against Environmental Mutagens and Carcinogens has been recommended.

79-0010. Truhaut, R. (Cent. Rech. Toxicol. Fac. Sci. Pharm. & Biol. Univ. Rene Descartes, Paris, France) **Problemes actuels de l'ecotoxicologie. [Current problems of ecotoxicology.]** *Mitt. Geb. Lebensmittelunters. Hyg.* 69(2): 233-263; 1978. (16 references) (French)

The scope, principles, methodology and perspectives of ecotoxicology, a designation first proposed in 1969 at the International Council of Scientific Unions in Stockholm are outlined, and channels by which pollutants enter and spread in the envirnment, the contamination of the food chain and the qualitative and quantitative toxic effects on ecosystems and man are examined. The principal sources of pollution examined include combustion products, industrial effluents, transportation-generated pollutants, chemicals used in industry, agriculture, food processing, households etc., aflatoxins and wastes of all sorts. The chemobiokinetics of pollutants in the ecosystems include absorption, concentration, metabolic transformation and reaction with chemical constituents of organisms. The various forms of toxicity enumerated include acute and subacute toxicity, long-term toxicity induced by repeated intake of small doses, long-term toxicity due to absorption of a single dose, teratogenicity, mutagenicity, and indirect toxicity due to poisoning of other living organisms in the biosphere. Further examined was the variability of toxicity due to difference of species, evolutionary stage and the effects of interaction between pollutants, the importance of establishing the relationship between dose and effect and the outlook of ecotoxicology for the future.

79-0011. Hay, A. (Author addres not given) **Dioxin source is "safe".** *Nature (London)* 274(5671): 526; 1978.

The United Kingdom Ministry of Agriculture, Fisheries and Food (MAFF) recently stated that it finds 2,4,5-T to be safe if used in the recommended way and for the recommended purpose. This coincides with the opinion recently expressed by the National Health and Medical Research

Council in Australia. In the opinions of these committees the amount of dioxin formed when 2,4,5-T treated plants are burned does not represent an excessive health risk. The MAFF will prepare a reference document on the subject. The Swedish Natural Science Research Council has recently published such a document, which recommended continuation of 2,4,5-T use while advising that 2,4,5-T manufacture be conducted so as to reduce or eliminate dioxin formation. It also recommends epidemiologic investigations of human populations exposed to phenoxy herbicides and dioxins. Studies of infant malformation rates in relation to parental herbicide exposure are underway in New Zealand and among US Vietnam veterans.

79-0012. Anonymous **Pathology, research and practice.** *Pathol. Res. Pract.* 162(1): 1-4; 1978.

Beitraege zur Pathologie has been renamed as *Pathology, Research and Practice.* This journal will also replace *Pathologica Europea* as the official journal of the European Society of Pathology. Articles from future issues of *Pathology, Research and Practice* will be included in the appropiate sections of *Pesticides Abstracts.*

79-0013. Sanwald, E. (Inst. Phytomed., Univ. Hohenheim, Stuttgart, Germany) **Physikalische Unkrautbekaempfung. [Physical weed control.]** *Z. Pflanzenkr. Pflanzenschutz* 8(suppl.): 173-180; 1977. (26 references) (German)

Physical weed control is the general designation applied to processes based on the effects of electromagnetic radiation, as opposed to mechanical, chemical, and biological weed control methods. Electromagnetic radiation from different parts of the spectrum can be used to destroy plants or their seeds. Application of γ-radiation at sufficient energy rates destroys viable seeds in the soil. Thermal radiation may be applied in various forms, such as heat sterilization, soil steaming and flame treatment. Flame treatment methods currently employed include nonselective flame treatment (surface treatment), strip or row treatment, selective flaming, pre-harvest flaming, and post-harvest burning. The possibilities of using mobile UHF transmitters with a high energy output for killing plants and seeds have also been investigated. The agricultural applications of laser radiation are just beginning to be studied. The amounts of energy consumed by flaming and UHF application are about 3.4×10^9-3.4×10^{10} J/ha, while the energy level represented by the use of herbicidal chemicals is about 4.5×10^6 J/ha.

79-0014. Steiner, H. (Landesanst. Pflanzenschutz, Stuttgart, Germany) **Pestizide und ihre Auswirkungen auf das Oekosystem. [Pesticides and their effects on the ecosystem.]** *Zesz. Probl. Pastepow Nauk Roln.* 96: 63-66; 1977. (16 references) (German)

Abiotic and biotic factors affecting the ecosystem and its self-regulatory power, chemical pest control including physiological changes induced in plants, persistence and pesticide decomposition, biological pest control including classical, biotechnical and genetic control and protection and cultivation of natural enemies of pests, the use of cultivation techniques in pest control and the application of integrated pest control programs are described. Pesticides can unbalance normally stable crop pest population levels. Pesticides can affect plant physiology by reducing the amino acid content, changing the carbohydrate content of plants and by the loss of vitamin C. Persistence has rendered a number of pesticides unacceptable in recent years; so far, the decomposition processes are known only in the case of 40-50% of the pesticides in use. Biological control makes use of enemies of pests, and disease inducing viruses, bacteria, and fungi. Biotechnical and genetic methods include light traps, artificial changes of the photoperiod disturbing ontogenesis, acoustic disturbance, the use of repeilents, and pheromones and endohormones interfering with metamorphosis. Cultivation methods controlling pests include crop rotation, choice of appropriate sowing times, and resistant strains. Integrated pest control involves a suitable combination of the above methods minimizing the need for the use of pesticides.

79-0015. Brevik, E. M.; Bjerk, J. E. (Dep. Pharmacol. & Toxicol., Vet. Coll. Norway, Oslo, Norway) **Organochlorine compounds in Norwegian human fat and milk.** *Acta Pharmacol. Toxicol.* 43(1): 59-63; 1978. (25 references)

Residue levels of organochlorine compounds in humans in Norway were studied. DDT was banned in Norway in 1970. In the samples of human fat and milk examined, DDD (TDE) was not detected. The total DDT levels in human milk decreased significantly at all sampling stations from the 1969/1970 sample series to the 1975/1976 series. From older subjects, this same trend was noted in fat samples. The study suggested that changes in human levels as a result of decreased DDT use were more easily detected by monitoring younger than older subjects for the change was mainly dependent on the duration of the exposure. When comparing the two series of samples for PCB residues, the PCB residues were found to have increased significantly both in perirenal fatty tissue from older subjects living in Oslo and in human milk samples from Oslo, Bergen, and Harstad. For human milk samples a considerable difference in residues was noticed between various sampling sites for HCB residues. These differences suggest that HCB release occurs most often in larger towns with varied industry. The residue levels of PCB, HCB, and total DDT are so low as not to be constituted as any human toxicological threat.

79-0016. Haefner, M. (Landesanst. Pflanzenschutz, Stuttgart, Germany) **Pentachlor nitrobenzol-, Pentachlor anilin- und Methylthio pentachloro benzol- Rueckstaende bei Gemuesekulturen und in gaertnerisch genutzten Erden. [Pentachloronitrobenzene, pentachloro aniline, methyl thiopentachlorobenzene residues in vegetables and in horticultural soils.]** *Anz. Schaedlingskd. Pflanzenschutz* 51(4): 49-57; 1978. (17 references) (German)

A study was undertaken to determine the chemistry of metabolization of PCNB (pentachloro nitrobenzene), contained in Brassicol, to PCA (pentachloro aniline) and MTPCB (methylthiopentachlorobenzene) in horticultural soils, assess the danger of the presence of MTPCB residues in soil treated with Brassicol before 1972, and investigate the potential presence of MTPCB residues in vegetables cultivated as follow-up cultures of lettuce treated with Brassicol. Immediately following treatment with Brassicol, horticultural soils can contain the same quantity, or more MTPCB, than PCA. However, with the passage of time, the MTPCB/PCA quotient becomes increasingly smaller demonstrating that MTPCB is less persistent in horticultural soils than PCA. Three years after the application of Brassicol, the soils examined contained about one tenth of MTPCB compared with the PCA residue, but leaf and root vegetables behave differently in this respect. Both types of vegetables grown between 1974 to 1976 on soils treated with Brassicol prior to and in 1972 were found to contain at most a residue of 0.02 ppm MTPCB. Fruits contained no detectable residue.

79-0017. Oliver, J. E.; Kontson, A. (Agric. Res. Cent., USDA, Beltsville, MD 20705) **Formation and persistence of *N*-nitrosobutralin in soil.** *Bull. Environ. Contam. Toxicol.* 20(2): 170-173; 1978. (3 references)

A six-month study was made of butralin metabolism in a soil high in nitrite. Results indicated that butralin could be metabolized to a nitrosamine under conditions where high amounts of nitrites were present. The 2-nitrosobutralin formed was very persistent in the soil and was still detectable 6 mo after formation. Due to the high levels of nitrite required in the soil to affect this nitrosation, the formation of the nitrosamine is probably of little significance. However, the persistence of the compound once formed becomes significant when the possible formation of nitrosated pesticides during the manufacture of dinitroaniline herbicides (which are applied to soil) is considered.

79-0018. Gilbert, M.; Lisk, D. J. (Pestic. Residue Lab., Dep. Food Sci., New York State Coll. Agric. & Life Sci., Cornell Univ., Ithaca, NY 14853) **Residues of Dacthal herbicide in carrots.** *Bull. Environ. Contam. Toxicol.* 20(2): 180-183; 1978. (1 reference)

Carrots were treated both in the pre-emergence and post-emergence stage with Dacthal (DCPA). Various soil types were used in the residue study, including sandy, sandy loam, clay loam, loamy sand, and silt loam soils. The amount of residue in the carrots was related to the application rate rather than to the type of herbicide formulation used, the timing of application, the harvest interval or the content of organic matter in the soil. The average recoveries of 0.5 ppm Dacthal, its mono- and diacid metabolites were 84, 75, and 82%, respectively. Possible further metabolism of the diacid metabolite is considered. Traces of the monoacid metabolite were detected in only a few samples. No diacid metabolite was recovered.

79-0019. Winterlin, W.; Kilgore, W.; Mourer, C.; Mull, R.; Walker, G.; Knaak, J.; Maddy, K. (Dep. Environ. Toxicol., Univ. California, Davis, CA 95616) **Dislodgable residues of dialifor and phosalone and their oxygen analogs following a reported worker-injury incident in the San Joaquin Valley, California.** *Bull. Environ. Contam. Toxicol.* 20(2): 255-260; 1978. (6 references)

Report of a worker injured through pesticide exposure in the San Joaquin Valley, in California, necessitated sampling of the foliage to determine dislodgable residues of dialifor and phosalone and their oxygen analogs. Penetrated residues were also determined, but more emphasis was placed on the dislodgable residues. Variability of the findings suggest that spot treatment or even repeated application with insecticides where insect infestations were greatest may have occurred. Unexpectedly large amounts of the oxygen analog of dialifor were found which may have had significant effects on worker illness. It is known that the oxygen analog is approximately 20 times more efficient than dialifor in inhibiting blood cholinesterase. This chemical is also quite persistent when compared with other organophosphate insecticides.

79-0020. Mathur, S. P.; Morley, H. V. (Soil Res. Inst., Res. Branch, Agric. Canada, Ottawa, Ont. K1A OC6, Canada) **Incorporation of methoxychlor-14C in model humic acids prepared from hydroquinone.** *Bull. Environ. Contam. Toxicol.*, 20(2): 268-274; 1978. (25 references)

The possible incorporation of methoxychlor in soil humus and the applications of model humic acids to such studies were investigated. To aid in the investigation, ^{14}C-methoxychlor was present during the chemical synthesis of a humic acid (HA) analogue. The yields of the analogues synthesized in the absence or presence of the chlorinated hydrocarbon insecticide were 948 and 987 mg, respectively. The HA analogues formed were similar to soil humic acids. All of the radioactivity from methoxychlor was found in the HA analogue produced. The persistence and mobility of methoxychlor may be affected by its incorporation into newly synthesized humic materials some of which are water soluble.

79-0021. Adamovic, V. M.; Sokic, B.; Jovanovic-Smilganski, M. (Inst. Health Prot. Beograd, Yugoslavia) **Some observations concerning the ratio of the intake of organochlorine insecticides through food and amounts excreted in the milk of breast-feeding mothers.** *Bull. Environ. Contam. Toxicol.* 20(2): 280-285; 1978. (12 references)

The intake of organochlorine insecticide residues in food and their subsequent excretion in mothers' milk was studied. The study was performed using mothers who were breast feeding one child, and mothers who were breast feeding twins. Both groups of mothers received the same quantity and content of daily meals and were not receiving additional foods, nor drugs during the time of the study. A greater amount of DDT derivatives was excreted through the milk than was daily taken in through the food. Particularly noted is the disproportion between the intake of *p,p'*-DDE and the excreted amount. A significant increase in the excretion of DDE in the milk of breast-feeding mothers with twins was noted in comparison to milk excreted by mothers nursing one child. Mothers of twins excreted 12 times more the amount of *p,p'*-DDE than did the other mothers, in an earlier study, but this was not found to be the case in the current research where both groups excreted similar amounts of *p,p'*-DDE.

79-0022. Mitchell, R. H.; West, P. R. (Dep. Chem., Univ. Victoria, Victoria, BC V8W 2Y2, Canada) **Contamination of the pesticide methoxychlor with the oestrogen chlorotrianisene.** *Chem. Ind. (London)* (15): 581-582; 1978. (12 references)

It is reported that methoxychlor, which has in general replaced DDT in use, contains the estrogen, chlortrianisene (CTA), which has been tested clinically as a lactation inhibitor and as a therapeutic agent against cancer. Gas chromatography has allowed the detection of CTA in a commerical methoxychlor sample at levels less than or equal to 110 ppm. Estrogen formation in methoxychlor is believed to be a result of the commercial formulation processes used. It is suggested that some secondary products found in various formulations may have far reaching effects on the environment, and, as in the case of methoxychlor, may be of more significance in environmental reactions than the relatively inactive major product.

79-0023. Meallier, P.; Nury, J.; Pouyet, B.; Coste, C.; Bastide, J. (Lab. Photochim., UER Chim. & Biochim., F-69621 Lyon, France) **Photodegradation des molecules organiques phytosanitaires. I. Proprietes spectroscopiques du parathion. [Photodegradation of phyto-sanitary organic molecules. I. Spectroscopic properties of parathion.]** *Chemosphere* 6(12): 809-14; 1977. (11 references) (French)

A spectroscopic study of parathion, designed to shed light on its photodegradation, was undertaken to determine the effect of substituents, specifically of the electronic properties of the diethyl thionophosphate group, on the benzene ring. The behavior of the parathion molecule in solution was also investigated by examining its ultraviolet spectrum within a wavelength range of 200 and 800 mμ. Results showed that the diethylthionophosphate group of parathion acts as a relatively weak electron donor. The molecule can be represented as possessing one electron attractor and one electron donor group which is hydrolyzed faster in darkness than under light if the two groups possess strong attractor and donor power, and slower if the attractor and donor power of the two groups are weak. In an aqueous medium the possibility of ionic splitting is indicated.

79-0024. Buser, H. R.; Bosshardt, H. P.; Rappe, C. (Swiss Fed. Res. Stn., CH-8820 Waedenswil, Switzerland.) **Identification of polychlorinated dibenzo-*p*-dioxin isomers found in fly ash.** *Chemosphere* 7(2): 165-172; 1978. (15 references)

Fly ash from municipal and industrial incinerators was analyzed for PCDDs (polychlorinated dibenzo-*p*-dioxins) and PCDFs (dibenzofurans). The ash was extracted with methylene chloride, and purified on both a silica microcolumn and an alumina microcolumn using *n*-hexane for elution. Purified samples were analyzed on a 25m 0.35mm ID OV-17 glass capillary column coupled to a Finnigan 4000 quadrupole MS with electron impact ion source. All samples showed significant quantities of PCDDs, PCDFs, and other chlorinated compounds. Twelve of 22 possible isomers of the tetra-CDDs, 10 of 14 penta-CDD isomers, and 8 of 10 hexa-CDD isomers were identified. More than 30 individual PCDDs were identified in fly ash from incinerators.

79-0025. McLeod, J. M.; McNeil, J. (Inst. Resource Ecol. Univ. British Columbia, Vancouver, BC V6T 1W5, Canada) **Fenitrothion: apparent long-term effects on larvae of a sawfly.** *Chemosphere* 7(7): 615-619; 1978. (5 references)

The toxic effects of fenitrothion residues were tested using the larvae of Swaine jackpine sawfly, *Neodiprion swainei* Middleton. Egg masses were collected from an untreated area, and reared on foliage from three sources: an area treated in 1974, an area treated in 1975, and an untreated area. The highest mortality rate was observed in the 1975 foliage group, but the 1974 foliage group also showed significantly increased

mortality. Sawflies exhibited differences in colonial behavior due to feeding on fenitrothion-treated foliage. The insecticide residues affected size, weight, and fecundity of the sawflies. Rearing of larvae on recently treated foliage gave similar results. The nature of residue uptake and residue levels of different insecticidal applications on and in foliage need to be determined before further studies can be undertaken.

79-0026. Nigg, H. N.; Thompson, N. P.; Allen, J. C.; Brooks, R. F. (Agric. Res. & Educ. Cent., Inst. Food & Agric. Sci., Univ. Florida, Lake Alfred, FL 33850) **Worker reentry and residues of ethion, parathion, and carbophenothion (Trithion) on Fla. citrus.** *Citrus Ind.* 59(8): 20-24; 1978. (12 references)

Effects of weather conditions were studied on residues of ethion, parathion, and carbophenothion, and their oxon metabolites. The chemicals were applied on Valencia leaves in Florida citrus groves for the purpose of determining safe times between application of the pesticide and reentry of the worker to the field. Two separate experiments, each consisting of four identical treatments, were conducted, one in the hot, wet weather of the summer and the other during a cool, dry period in the fall. The oxon metabolite levels noted during these studies were low and were never seen to exceed the residue levels of the parent compound. Residue data had a relation to temperature, rainfall, free water on the leaves, and time. About 90 to 98% of the disappearance of the residues could be attributed to these four factors. Under the prevailing conditions in Florida citrus groves, the possibility of illness due to pesticides in workers re-entering the field is very low.

79-0027. Nigg, H. N. (Agric. Res. & Educ. Cent., Univ. Florida, Inst. Food & Agric. Sci., Lake Alfred, FL 33850) **Worker reentry in Florida citrus: Comparison of two pesticide residue techniques for citrus foliage.** *Citrus Ind.* 59(8): 24-26; 1978. (9 references)

The reliability of data concerning pesticide residues gathered by means of a vacuuming method was determined by comparing the findings with those obtained by the dislodgeable particulate residue technique. The study was performed under conditions as they exist in Florida. Valencia trees were treated with different applications of parathion and each treatment was replicated four times. The first treatment plan was parathion as a wettable powder, 5 lb, 15 WP/100 gal. The second treatment pattern was parathion emulsifiable concentrate, 32 oz 4E/100 gal. The third formed the control. In studies concerned only with the vacuuming method, different results were obtained with the use of a 5.0 mμ filter or a glass fiber filter. This difference appeared to be related to the flow rates of the 5.0 mμ filter and the glass fiber filter. When comparing the vacuum method against the dislodgeable method, significantly less pesticide residues were obtained with the vacuum method. The vacuum method removes about 20% of the particulate matter compared to the dislodgeable technique, using the WP formulation. The vacuum method also removes about 25% of the particulate matter comparing the EC to the WP formulation. It is concluded that the recommended leaf punch dislodgeable residue particulate technique is the one to use for protecting agricultural field workers when registering pesticides for use on Florida citrus.

79-0028. Desi, I.; Gonczi, Cs.; Pasztor, Zs.; Hollo, A. (Public Health Res. Inst., Budapest, Hungary) **A Balaton vizet es legteret szennyezo peszticidek szintjenek a vizsgalata. [Pesticide levels in the water of Lake Balaton and its air space.]** *Egeszsegtudomany* 22(2): 139-145; 1978. (17 references) (Hungarian)

Lindane residue levels were studied in samples from different open water areas (inflows as well as from various drinking water outlets) of Lake Balaton in 1973, 1975, and 1977, and the 2,4,5-T and 2,4-D levels were measured during the 1967-1969 period; both the frequency and absolute value of the levels exceeding the maximum allowable concentration (MAC) set by the Comecon (0.01 μg/l) had decreased considerably. The residue levels found for 2,4-D and 2,4,5-T were consistently below the respective MAC values (5 and 1 μg/l, respectively). Consequently, the lindane, 2,4-D and 2,4,5-T levels did not present any hazard in drinking or bathing water. Malathion levels were measured in the air following the aerial application of an ultra low volume formulation at 20 m altitude at a rate of 0.4 kg/ha. The highest value measured was 839 $\mu g/m^3$, versus a maximum allowable work area concentration of 15,000 $\mu g/m^3$. In view of the low residue level and of the short-term exposure, the aerial distribution of malathion is believed to be harmless.

79-0029. Goldberg, E. D.; Bowen, V. T.; Farrington, J. W.; Harvey, G.; Martin, J. H.; Parker, P. L.; Risebrough, R. W.; Robertson, W.; Schneider, E.; Gamble, E. (Geol. Res. Div., Scripps Inst. Oceanogr., Univ. California, San Diego, La Jolla, CA 92093) **The mussel watch.** *Environ. Conserv.* 5(2): 101-125; 1978. (24 references)

The possible use of bivalves for monitoring levels of pollutants in coastal marine waters has been investigated. Such studies have indicated a source of DDT residues somewhere in the San Pedro-Los Angeles area where maximum values were noted. Tracing these DDT residues indicated the source to be municipal wastewaters which were discharged in the past from a manufacturing plant in Los Angeles through the Whites Point outfall. As an example of the discharge volume, it was estimated that in the year 1971 a total of 19 metric tons of DDT residues were passed. No significant elevation in DDT residues were noted in mussels or oysters collected from waters off the northwestern or eastern coasts, and the levels which were present have resulted from agricultural use of these compounds in past years. Several high points of PCB contamination were spotted adjacent to highly industrialized areas on both coasts as revealed by mussel analyses. Specific areas include the South San Francisco Bay, Rincon Point, Point Fermin, San Pedro Harbor, and San Diego Harbor. The area of greatest PCB contamination was New Bedford, Massachusetts. The source may be a manufac-

turer of electrical capacitors whose plants have had leakages occurring over the past several decades. Monitoring by bivalves has shown no seasonal variations in the levels of halogenated hydrocarbons detected.

79-0030. Hemer, M. (Inst. Pflanzenschutz, Saatuntersuch. & Bienenkd. Landwirtschaftskammer Westfalen-Lippe, Muenster, Germany) **Das Rueckstandsproblem im westfaelisch-lippischen Obst- und Gemuesebau. [Residue problems in fruit and vegetable growing in Westfalen-Lippe.]** *Gesunde Pflanz.* 29(19): 229-230, 232; 1978. (German)

In the period from 1973 to 1976 fresh apples, strawberries, raspberries and cherries from crops grown in Westfalen-Lippe were randomly tested for residues of benomyl, dichlofluanid, captan, mancozeb, propineb, thiram, zineb, azinphos methyl, binapacryl, bromophos, bromophos-ethyl, demeton, diazinon, dimethoate, endosulfan, mevinphos, parathion, phosalone, tetradifon and other pesticides. Only in a single case (thiram residues in cherries) did a pesticide residue exceed the maximum permissible level. All other samples were either free of residues, or had residues far below permissible limits. Tests on spinach, peas, beans and cabbage performed in 1976 for residues of 5 herbicides and 3 insecticides were likewise negative. In contrast, tests for Brassicol (PCNB) residues (forbidden in use in Germany) on lettuce imported from Holland revealed excessive residues in 57% of the tests (1.01 to 4.7 ppm above the maximum permissible level of 1.00 ppm) in 1976, and excessive residues in 46.5% of the tests in 1977. Methyl bromide residues in lettuce samples also exceeded the permissible level in 12.5% of the tests.

79-0031. Kathpal, T. S.; Shanker, A.; Shrivastava, B. P. (Dep. Soil Sci & Agric. Chem., Univ. of Udaipur, Udaipur, India 313 001) **Extent of carbaryl residues in and on grape berries.** *Indian J. Agric. Sci.* 48(3): 179-183; 1978. (7 references)

Grape vines (*Vitis vinifera*) of "Perlette" variety of four years were examined to determine the extent of carbaryl residues in and on grape berries. Plants were treated 15 days apart with two applications of 0.1 and 0.2% carbaryl spray until drenched. Residues were determined by the standard colorimetric technique after extraction with methylene chloride. For the 0.1% carbaryl spray, 94% of the first application had dissapated within 15 days, while 97% of the spray had dissapated 15 days after the second spraying. The 0.2% solution showed similar results, with 90% dissapated 15 days after the first application, and 92% fifteen days after the second application. Tolerance levels of 5 ppm were reached after 9 days for the 0.1% solution, and after 15-18 days for the 0.2% solution. Hydrolytic degradation, and changes in temperature and rainfall accounted for the dissipation of carbaryl. A waiting period of 10-20 days after the last application is suggested before harvesting grapes sprayed with carbaryl.

79-0032. Panizzi, A.; Luppi, G.; Caserio, G. (Lab. Chim. Citterio S.p.A., Univ. Milano, Milan, Italy) **Residui di antiparassitari nelle carni e in prodotti carnei. [Pesticide residues in meat and meat products.]** *Ind. Aliment. Pinerolo Italy* 17(3): 193-195; 1978. (9 references) (Italian)

Between 1973 and 1977 at the request of US authorities, 242 samples of Italian and imported pork, 182 samples of domestic and imported beef, 212 samples of domestic pork fat, 112 samples of pork liver, 9 samples of imported swine stomachs, 171 samples of raw salami paste and 27 samples of mortadella salami were analyzed by gas chromatography for their content of hexachlorobenzene, lindane, heptachlor epoxide, heptachlor, DDE, DDD (TDE) and DDT residues. All residues were found to be below US maximum permissible levels and also below the much stricter Swiss levels. Hexachlorobenzene, lindane, DDE and DDT residues were found in almost all the samples examined. DDD and heptachlor epoxide residues were found in a very small percentage of samples (the highest, 6.6%). No residues of organophosphorus pesticides were found.

79-0033. Ripley, B. D.; Cox, D. F. (Prov. Pestic. Residue Test. Lab., Ont. Minist. Agric. & Food, Univ. Guelph, Guelph, Ont. N1G 2W1, Canada) **Residues of ethylenebis (dithiocarbamate) and ethylene thiourea in treated tomatoes and commercial tomato products.** *J. Agric. Food Chem.* 26(5): 1137-1143; 1978. (25 references)

Residues of ethylenebis (dithiocarbamates) (EBDC) and ethylene thiourea (ETU) were monitored in tomatoes after application of several EBDC formulations from 1973 to 1977. After spraying at recommended rates, residues of EBDC on tomatoes were below the current Canadian tolerance of 4 ppm at the recommended harvest interval. ETU was detected during the analysis period at levels of < 0.05 ppm on tomatoes whereas ETU residues in tomato juice and whole pack products, prepared from the treated tomatoes in the first 3 days after EBDC application, ranged from not detected (< 0.01) to 0.17 ppm. Commercial tomato products contained traces of EBDC (< 0.2 ppm) and ETU residues of ≤ 0.03 ppm. Boiling of some samples demonstrated additional ETU formation. (Author abstract reprinted by permission of the American Chemical Society)

79-0034. Pringle, J. C., Jr.; Anderson, L. W. J.; Raines, R. W. (Aquat. Weed Control Res. Lab., Sci. & Educ. Adm., USDA, Denver, CO 80225) **Residues in crops irrigated with water containing simazine.** *J. Agric. Food Chem.* 26(5): 1143-1147; 1978. (10 references)

Annual ditchbank vegetation growing on the inside slopes of irrigation canals can be managed with low-rate applications of simazine. When a herbicide is applied to the bank of either a flowing or a dry canal, some residue might be expected in the irrigation water applied to crops. Six crops representing nine commodity groupings were irrigated with water containing simazine [2-chloro-4,6-bis(ethyl- amino)-*s* -triazine] at 0.01 and 0.10 mg/L. The treatment levels were selected to simulate the maximum amount and ten times the maximum that might be expected to enter irrigation water after bank application for weed control. Herbicide was ap-

plied to randomized test plots through sprinkler and furrow irrigation, and crops were harvested 7 and 30 days after treatment. Samples were analyzed for residues with a gas chromatograph equipped with a nitrogen and phosphorus detector. No simazine residue was found in corn grain and pinto bean pods while trace amounts were found in sugar beets, corn foliage, and tomatoes. Sugarbeet foliage collected 7 days after application of simazine at 0.01 and 0.01 mg/L by sprinkler irrigation contained 5 μg/kg. Alfalfa contained the most residue of the crops tested; samples collected from plots that were sprinkler-irrigated with water containing simazine at 0.10 mg/L contained 6.4 μg/kg. (Author abstract reprinted by permission of the American Chemical Society)

79-0035. Venkateswarlu, K.; Sethunathan, N. (Lab. Soil Microbiol., Cent. Rice Res. Inst., Orissa 753006, India) **Degradation of carbofuran in rice soils as influenced by repeated applications and exposure to aerobic conditions following anaerobiosis.** *J. Agric. Food Chem.* 26(5): 1148-1151; 1978. (8 references)

The persistence of carbofuran (2,3-dihydro- 2,2-dimethyl- 7-benzofuranyl *N*-methylcarbamate) in flooded rice soils was studied after its repeated application. Repeated applications of carbofuran to flooded rice soils at rates close to field applications do not seem to favor rapid buildup of the microoorganisms capable of decomposing carbofuran. An isotope study showed that degradation of carbofuran in flooded soils was more rapid under undisturbed conditions than under aerobic conditions provided by shaking. Under continued anaerobiosis of undisturbed flooded soils, the hydrolysis products, carbofuran phenol (2,3-dihydro- 2,2-dimethyl-7- hydroxybenzofuran) in particular, accumulated; but when the undisturbed soil was returned to aerobic conditions, the hydrolysis products decreased rapidly. (Author abstract reprinted by permission of the American Chemical Society)

79-0036. Helling, C. S.; Krivonak, A. E. (Agric. Environ. Qual. Inst., ARS, USDA, Beltsville, MD 20705) **Physiochemical characteristics of bound dinitroaniline herbicides in soils.** *J. Agric. Food Chem.* 26(5): 1156-1163; 1978. (34 references)

Soil bound residues of six [*phenyl*-^{14}C] dinitroaniline herbicides constituted 7-21% of the original ^{14}C added to aerobically incubated Matapeake soil. Bound residues of butralin [4-(1,1- dimethylethyl)- *N*-(1-methylpropyl)- 2,6-dinitrobenzeneamine] from Chillum soil were 3 and 13% after aerobic and anaerobic incubation, respectively. Prolonged benzene-methanol extraction gave stable residue values. The extracts contained unidentified radioactive components, chromatographically separable from the parent compounds. Ultrasonic dispersion in certain alkaline solvents increased extractability of anerobic butralin residues, probably because organic matter was solubilized. Distribution of residues in fulvic acid, humic acid, and humin was (a) butralin (aerobic Chillum soil), 51, 7, and 42%; (b) butralin (anaerobic Chillum), 14, 40, and 46%; and (c) 6 herbicides (aerobic Matapeake soil), 50, 15-20, and 25-35%. When we used a milder extraction procedure, anaerobic bound butralin was widely distributed among soil organic and organo/mineral fractions, especially in humic acid and humin. The six dinitroaniline residues were thermally degraded between ca. 250 and 500° C: anaerobic butralin was lost at 300-375°C. This corresponds to oxidation of phenolic hydroxyl (and perhaps carboxyl) groups in soil organic matter, but tends to negate the occurrence of bound ^{14}C in clay interlayers or as carbonate. (Author abstract reprinted by permission of the American Chemical Society)

79-0037. Walter-Echols, G.; Lichtenstein, E. P. (Dep. Entomol., Russel Labs, Univ. Wisconsin, Madison, WI 53706) **Effects of lake bottom mud on the movement and metabolism of ^{14}C-phorate in a flooded soil-plant system.** *J. Environ. Sci. Health B* 13(3): 149-168; 1978. (7 references)

The effects of lake bottom mud on the movement and metabolism of ^{14}C-phorate in a flooded soil-plant system were investigated. A layer of lake mud underlying insecticide-treated loam soil significantly increased the persistence of phorate, and reduced the amounts of ^{14}C-phorate residues which were released from the sediments into the water. Sixty-two percent of the applied phorate was recovered after a 2 wk period, 13% as phorate sulfoxide, but none as phorate sulfone. The metabolism of phorate was further reduced, and even less radiocarbon moved into the water when insecticide-treated loam soil was mixed with the mud sediments in the lake. A decline in the radiocarbon content of the soil-lake mud mixture during the first 3 days of incubation was noted with a concomitant increase of radioactivity in the water. After that time, the amounts of labeled compounds remained constant in the soil-lake mud, decreased in the water, and increased steadily in the *Elodea* plants.

79-0038. Miles, J. R. W.; Harris, C. R. (Res. Inst., Agric. Canada, London, Ont. N6A 5B7, Canada) **Insecticide residues in organic soils of six vegetable growing areas in Southwestern Ontario, 1976.** *J. Environ. Sci. Health B* 13(3): 199-209; 1978. (19 references)

The occurrence of insecticide residues in six organic soils was studied. These six soils were in widely separated areas on 28 vegetable-growing farms located in southwestern Ontario. In general the organic content of the soils was greater than 65%. In soil on all farms residues of organochlorine insecticides were detected. The total DDT ranged from less than 0.1 to 29 ppm. Dieldrin, endosulfan, and endrin were present at levels up to 1.7, 1.8, and 0.9 ppm, respectively. On 26 farms, residues of organophosphorus insecticides were found with ethion predominating at up to 7.8 ppm. Levels as high as 2.5, 1.1, and 0.3 ppm were recorded for parathion, fonofos, and diazinon, respectively. Dichlofenthion was detected in trace amounts on a few farms. Carbamate insecticides especially carbofuran, were found on ten farms, with one soil containing 8.7 ppm carbofuran. In general total-DDT residues were highest, followed by organophosphorus, cyclodiene, and carbamate insecticide residues in that order.

79-0039. Williams, I. H. (Res. Stn., Agric. Canada, Vancouver, BC V6T 1X2, Canada) **Dissipation of sulfotep and nicotine in a greenhouse atmosphere following their use as fumigants.** *J. Environ. Sci. Health B* 13(3): 235-241; 1978.

Assessment was made of the safety of the current practice of fumigating a greenhouse at the end of the working day and ventilating it for 1 hr the next morning before allowing reentry to the facility. Fumigants used were Plant-Fume smoke fumigators which contained either 11 g of sulfotep or 14 g of nicotine. Both were designed to treat a 290 m^3 volume. At 1 hr after fumigation the concentration of nicotine in the atmosphere was one fifth that of sulfotep. From that time on the rate of dissipation of nicotine was slightly less than that of sulfotep. After ventilation the concentration of sulfotep decreased to 0.016 μg/l which was well below the threshold limit value of 0.2 μg/l. The concentration of nicotine was so low after 24 hr that no further sample was taken after ventilating. Threshold limit values of sulfotep and nicotine were reached 24 hr and 3.5 hr after fumigation, respectively. At 16 hr, the normal elapsed time between fumigation and re-entry, the level of sulfotep was 0.3 μg/l, which is above the threshold limit values.

79-0040. Viswanathan, R.; Scheunert, I.; Kohli, J.; Klein, W.; Korte, F. (Inst. Okol. Chem. Ges. Strahlen. & Umweltforsch., Munich, Germany) **Long-term studies on the fate of 3,4-dichloroaniline-C-14 in a plant-soil-system under outdoor conditions.** *J. Environ. Sci. Health B* 13(3): 243-259; 1978. (12 references)

The fate of ^{14}C-3,4-dichloroaniline (DCA) applied to soil under outdoor conditions was investigated. At the end of the first crop season, 69.4% of the total applied radioactivity was found in soil, dispersed down to a depth of 30 cm. About 66% of the residue was detected in the uppermost layer, *i.e.*, in the site of application, and only 3% was dispersed in the deeper layers. Barley plants and weeds had taken up only 0.4% of the total applied radioactivity. Major residues (0.2%) remained in the barley roots. Low stems and straw contained 0.1% each, whereas residues in weeds as well as in barley grain and husks were negligible. Leaching water contained less than 0.1% of the radioactivity applied. The unrecovered remainder has been volatilized into the air either as unconverted 3,4-DCA or as conversion products which included carbon dioxide.

79-0041. Marriage, P. B.; Hamill, A. S.; von Stryk, F. G. (Res. Stn., Agric. Canada, Harrow, Ont. NOR 1G0, Canada) **Response of soybean plants to metribuzin and interaction with atrazine residues.** *J. Environ. Sci. Health B* 13(3): 287-297; 1978. (17 references)

A four year study was conducted to determine effects on soybean growth and yield when metribuzin was applied to soil to which various levels of atrazine had been applied the previous year. Degradations of both atrazine and metribuzin were studied. Atrazine had been applied at rates of 0 to 2.24 kg/ha by 0.28 g/ha increments. Metribuzin was used as a pre-emergence herbicide, being applied at 1.12 kg/ha. Soybeans planted in atrazine-treated soil in the year atrazine was applied were consistently visibly damaged at the 0.56 kg/ha rate and injury increased at the higher rates. Yield was not significantly reduced until the rate of atrazine reached 0.84 kg/ha. In the absence of atrazine residue, metribuzin at 1.12 kg/ha caused injury to soybean plants in each year. Such injury consisted of leaf chlorosis and necrosis ranging from mild to severe. Plant stand was reduced in two of three years. Plant growth was markedly reduced. Atrazine residues did not interact with metribuzin to cause increased injury to the soybean plant except in the year 1973 when a significant interaction was noticed that reduced plant weight. Metribuzin was degraded rapidly in each year with about a 90% breakdown by October.

79-0042. Khan, S. U.; Schnitzer, M. (Chem. & Biol. Res. Inst., Res. Branch, Agric. Canada, Ottawa, Ont. K1A OC6, Canada) **UV irradiation of atrazine in aqueous fulvic acid solution.** *J. Environ. Sci. Health B* 13(3): 299-310; 1978. (10 references)

The photodecomposition of atrazine in aqueous fulvic acid solution was investigated. The photolysis of the herbicide was delayed by the presence of fulvic acid. Photolysis followed first order reaction kinetics with respect to herbicide concentration. The stability of atrazine to ultraviolet radiation in aqueous solution increased in the presence of fulvic acid. The half-life values were highest at low pH levels and tended to decrease with increasing pH levels and tended to decrease with increasing pH of the solution. It is suggested that this finding may be related to the fulvic acid having a higher molecular weight and thus a larger surface to adsorb on, or react with at lower pH than at higher pH levels. The photoproduct of atrazine in water after 3 hr of ultraviolet irradiation and treatment with diazomethane showed a retention time on gas chromatography and a mass spectrum identical to 2-methoxy-4- ethylamino- 6-isopropylamino- *s*-triazine. It is assumed that either fulvic acid or products resulting during the course of fulvic acid photooxidation act as sensitizers for the further degradation of 2-hydroxy analogues to *N*--dealkylated products.

79-0043. Semeluk, G. P.; Unger, I.; Addison, J. B. (Dep. Chem., Univ. New Brunswick, Fredericton, NB E3B 5A3, Canada) **The luminescence properties of pesticides: III. The fluorescence lifetimes of some carbamates.** *J. Lumin.* 17(2): 211-215; 1978. (15 references)

The fluorescent lifetimes of a number of commonly used carbamates were investigated. Compounds investigated included *m*-terphenyl, phenmec, metacrate (MTMC), matacil (aminocarb), zectran (mexacarbate), landrin, and seven (carbaryl). The fluorescent lifetimes of these compounds varied by as much as two orders of magnitude. The fluorescent decay time for benzene is 29 nsec. Substitution with a moiety having non-bonding electrons which can conjugate with the aromatic ring, as in the compound phenmec, results in a decrease in fluorescent lifetime of about one order of magnitude, approximating the fluorescent decay time found in this study,

2.9 nsec. Metacrate, a substituted toluene, has a fluorescent decay time of 5.0 nsec. Landrin has a decay time of 8.6 nsec, similar to phenmec and metacrate (5.0 nsec) which are other alkyl substituted carbamates. Sevin, α-substituted naphthalene, has a fluorescent decay time of 32.8 nsec. Matacil has a decay time of 3.6 nsec, which is expected from the molecular structure. However, the fluorescent decay time of 108 nsec for zectran is far from that which was expected, and no explanation of this finding has yet been given.

79-0044. Glotfelty, D. W. (USDA Beltsville, MD 20705) **The atmosphere as a sink for applied pesticides.** *J. Air Pollut. Control Assoc.* 28(9): 917-921; 1978. (55 references)

Studies have been made which determine the function of the atmosphere as a sink for pesticide contamination due to the finding of pesticide residues in places remote from application sites. Application drift, wind erosion of treated soil, and post-application volatilization all contribute pesticides to the atmosphere. Without taking proper precautions, even low volatility compounds may evaporate from treated areas. Horizontal transport and lateral dispersion are normally much faster than vertical mixing in the atmosphere. Thus residues are moved over long distances close to the surface, and are continuously removed from the atmosphere by deposition on exposed soil and vegetation. Residues which are transported to higher levels can be adsorbed onto aerosols, or dissolved in rain, and thus brought back to the surface. Photochemical reactions by sunlight play a significant role in degradation of environmental contaminants carried by the atmosphere.

79-0045. Taylor, A. W. (Agric. Environ. Qual. Inst., Beltsville Agric. Res. Cent., USDA, Beltsville, MD 20705) **Post-application volatilization of pesticides under field conditions.** *J. Air Pollut. Control Assoc.* 28(9): 922-927; 1978. (23 references)

Various studies have been made on volatilization of pesticides after application under field conditions and the resulting air pollution. From plant or moist soil surfaces, volatilization can be a significant factor with large amounts of chemicals reaching the air. Losses of 90% within 3 days may be reached for volatile compounds. Losses are much less from dry soil; due in part to strong adsorption of pesticides by the dry soil, which resulted in lowered vapor pressure so that volatilization from exposed dry surfaces is practically totally inhibited. The volatilization of pre-emergence herbicides is erratic, depending on soil drying by evaporation and rewetting by rainfall. Volatilization of materials mixed into the soil is much less and seldom approaches 20% over an entire growing season. The depth to which the compound is mixed in the soil has a significant effect on losses by volatilization. It is difficult to predict accurately volatilization loss on a general scale, but estimates can be made following application of given chemicals in given situations, such as 2,4-D, DDT and dieldrin.

79-0046. Van Renterghem, R. (Stn. Lait. Etat Melle, Cent. Rech. Agron. Etat, Gand, Belgium) **L'influence des procedes technologiques de fabrication de produits laitiers sur la teneur en pesticides organochlores. [Effect of technological milk product manufacturing procedures on the content of organochlorinated pesticides.]** *Lait* 58(573-574): 141-54; 1978. (13 references) (French)

The effects of processing milk to cream, butter, condensed milk, milk powder and Gouda cheese (48% fat content) were studied with a veiw of determining whether the processing resulted in a reduction of the milk content of BHC, α-BHC, β-BHC, γ-BHC (lindane), heptachlor epoxide, dieldrin, *p,p'*-DDT, *o,p'*-DDT, *p,p'*-DDE and *p,p'*-DDD. Customary processing methods used by dairies cannot be expected to reduce the pesticide residues by evaporation or degradation; significant reductions which were found in the cheese production (β-BHC), butter production (α-BHC, β-BHC and γ-BHC) and cream production (β-BHC and *p,p'*-DDT) are attributed to the respective partial elimination via skim milk, buttermilk and whey. In contrast, special processing such as the thermal high vacuum treatment of milk fat and treatment of milk with hydrogen peroxide destroys to a large degree organochlorine pesticides while the spray method used to produce milk powder does not reduce the original pesticide content of the milk used.

79-0047. Krause, G. H. M. (Author address not given) **Grenzwertvorschlag fuer Arsen. [Tolerance limit for Arsenic.]** *Lufthyg. Silikoseforsch.* 10: 158-170; 1978. (71 references) (German)

Concentrations of arsenic (as arsenic trioxide and arsenic pentoxide) found in the atmosphere, water and foods in various countries and the toxicological effects of inorganic arsenic compounds on humans are reviewed. On this basis the maximum permissible concentration of 0.025 μg As/m^3 air is proposed as a temporary standard. In the U.S. median As levels in the atmosphere are 0.02 μg/m^3, in drinking water mostly below 0.04 mg As/l, and in foods below 0.5 mg/kg. It is estimated that the daily normal human diet contains 30 μg As. Arsenic is stored in the liver and kidneys and the degree of its toxicity depends on the chemical valence of the compound. Occupational exposure can cause skin cancer, lung cancer, tumors of the lymphatic system and intestinal cancer and inorganic compounds of arsenic must be considered to be carcinogenic or cocarcinogenic. Compliance with the above preliminary standard is thought to reduce considerably the carcinogenic effect of inorganic arsenic.

79-0048. Buser, H. R.; Bosshardt, H. P. (Sekt. Pflanzensch., Eidgenoessische Forschungsanst. Obst. Wein. & Gartenbau, Wadenswil, Switzerland) **Polychlorierte Dibenzo- *p*-dioxine, Dibenzofurane und Benzole in der Asche kommunaler und industrieller Verbrennungsanlagen. [Polychlorinated dibenzo- *p*-dioxins, dibenzofuranes and benzenes in the fly ash of municipal and industrial incinerators.]** *Mitt. Geb. Lebensmittelsunters. Hyg.* 69(2): 191-199; 1978. (11 references) (German)

Fly ash and smoke emitted from the stacks of the municipal incinerator Hagenholz (Zurich) and the thermal power plant Aarau were analyzed by gas chromatography for their content of polychlorinated dibenzo-*p*-dioxins (PCDD's), dibenzofurans (PCDF's) and hexachlorobenzene (HCB). The ash of the incinerator contained a total of 0.220 ppm PCDD's, a total of 0.085 ppm PCDF's, and a total of 1500 ppm HCB, the ash from the thermal power plant a total of 0.640 ppm PCDD's and a total of 0.320 PCDF's. These potentially harmful compounds were previously thought to be environmental contaminants of industrial origin but not from incinerators of power plants. The origin of the PCDD's and PCDF's in fly ash is unknown as are the quantities actually released into the environment; the exact chlorine substitutions of individual isomers are also unknown therefore their toxicity cannot be assessed. The very persistent HCB's found in fly ash constitute another source of contamination of the food chain.

79-0049. Gunner, H. B.; Rho, J. (Dep. Environ. Sci., Massachusetts Univ., Waltham, MA) **The relationship of lake quality to specific urbanization stresses.** *Natl. Tech. Inform. Serv.* PB-281,579: 44p.; 1977. (11 references)

Two comparable impoundments were selected for study. Pottapaug Pond provided baseline data uncomplicated by human activity. Lake Lashaway has a long history of human activity and receives heavy nutrient loads and urban runoff. A comparison was made of the seasonal patterns of water quality and sedimentary records of the two bodies of water. Nitrate concentrations were significantly higher in Lake Lashaway in winter. This seasonal pattern results from a high rate of input from surface runoff and/or leaching. These appreciable amounts of nitrate supported the growth of aquatic weeds, indigenous bacteria and algae. Annual control of aquatic weeds by herbicide treatment in Lake Lashaway had adverse effects on water quality by increasing nutrient levels, reducing oxygen concentration in the littoral zone and subsequently killing fish. Littoral macrophytes appear to temporarily store phosphorus and nitrogen during the growing season but release them at later times. The accumulation of heavy metals and chlorinated hydrocarbon pesticides represents a potential source of pollutants. Concentrations of heavy metals, particularly Zn, in sediment cores, from Lake Lashaway but not Pottapaug, provide an indication of related human/urban activity. Increased nitrogen concentrations, raised phosphorus levels, and the presence of heavy metals and pesticides in sediment cores all offer indices of the impact of urbanization on impoundments. (Author abstract by permission)

79-0050. Demeterio, J. L. (Water Resour. Res. Cent., Guam Univ., Agana, Guam) **Quality of percolate below the root zone of selected vegetables grown in northern Guam.** *Natl. Tech. Inform. Serv.* PB-280,660: 28p; 1978. (15 references)

Northern Guam farms were surveyed in 1976 and 1977 for pesticide and fertilizer usage. The major pesticides used in 1976 and 1977 were Sevin (carbaryl), diazinon, malathion, Dibrom (naled). Kelthane (dicofol) was widely used in 1976 but not in 1977. Animal manure, 15-15-15 and 16-16-16 were the most widely used fertilizers in 1976 and 1977. A notable increase in the use of ammonium sulfate occurred in 1977. The chance of groundwater contamination from agricultural chemicals is minimal since a very small percentage of the land area is currently being utilized for full-time farming. Bench scale lysimeter studies were conducted to determine the concentrations of nitrogen and phosphorus in percolate water after passing the root zone of selected fertilized vegetables. Tomatoes, Chinese cabbage, head cabbage, eggplant, and bell pepper were grown using ammonium sulfate, chicken manure, potassium nitrate, and 15-15-15 as fertilizers. Potassium nitrate is the best nitrogen source but is cost prohibitive and 15-15-15 percolates excessive amounts of nitrate and ammonia nitrogen. Actively growing vegetables used the nitrogen in the ammonium sulfate and chicken manure at comparable rates. (Author abstract by permission)

79-0051. Clark, T.; Watkins, D. A. M. (Long Ashton Res. Stn., Univ. Bristol, Bristol BS18 9AF, England) **Photolysis of dichlofluanid.** *Pestic. Sci.* 9(3): 225-228; 1978. (10 references)

Dichlofluanid was found to be degraded by ultraviolet light in methanol, benzene and acetone solution. The products from acetone solution included *N,N*- dimethyl- *N'*-phenyl sulphamide, phenylisocyanate, phenyl isothiocyanate and dimethyl amidosulphonyl chloride. GC-MS studies further indicated the presence of bis (dichlorofluoromethyl) disulphide, 1-(dichloro fluoromethylthio) propan-2-one and 1-(dichloro fluoromethyl sulphonyl) propane-2-one. In vitro tests against *Botrytis cinerea* showed that irradiation decreased the activity of dichlofluanid and that synergism did not occur. (Author abstract by permission)

79-0052. Thielemann, H.; Grahneis, H. (Hyg. Inst., Martin Luther Univ., DDR-402 Halle Saale, DDR) **Untersuchungsergebnisse zur Frage der Kontamination von Humanmilch mit Gesamt-DDT (DDT+DDE) im Stadtgebiet von Halle (Saale) im Jahre 1977. [Contamination of human milk with total DDT (DDT + DDE) within the urban area of Halle (Saale) in 1977.]** *Pharmazie* 33(6): 374; 1978. (3 references) (German)

In 1977 215 samples of human milk from nursing mothers residing in Halle (Saale) were analyzed by thin layer chromatography for their total DDT and DDE isomer residue levels. In 172 samples no residue was detectable, 13 samples contained 0.1 ppm, 15 samples 0.25 ppm, 10 samples 0.5 ppm, 3 samples 0.75 ppm, and 2 samples 1.0 ppm total DDT indicating a steady decrease from findings in preceding years as a result of the restrictions placed on the use of DDT by East Germany authorities in 1970. The intake of chlorinated hydrocarbons by sucklings is double that of the mothers due to the mobilization of stored residues. A few of the samples also contained PCB residues disseminated into the environ-

ment by industrial products and invading the food chain as a result of their persistence similar to that of organochlorine pesticides.

79-0053. Cvak, Z.; Cerna, E. (Author address not given.) **Prispevek k zjistovani chlorovanych pesticidu v mlekarenskych vyrobcich. [Tracing the presence of chlorinated pesticides in dairy products.]** *Prum. Potravin* 29(8): 461.93-462.94; 1978. (8 references) (Czech)

Analyses of milk, dried milk and cheese samples from the East Bohemian dairy at Opocno performed in 1975 and 1976 demonstrated that DDT, DDE, DDD HCH (BHC) and hexachlorobenzene residues were on the decrease and far below the maximum permissible levels in milk fat. The average seasonal (spring, summer, fall and winter) levels found in cheese (mg/kg fat) were: 0.001, 0, 0.001 and 0.001 for *p,p'* -DDT; for *p,p'*-DDE, 0.019, 0.41, 0.018 and 0.017; for HCH, 0.177, 0.095, 0.105, and 0.080; and for hexachlorobenzene, 0.246, 0.165, 0.206 and 0.216 respectively. The only problem area are milk fat residues of HCB which are not decreasing and are at the maximum permissible level of 0.5 mg/kg fat. Therefore, fodder, soil, water and fertilizers are being routinely analyzed for their HCB content.

79-0054. Uno, M.; Okada, T.; Onji, Y.; Matsubara, S.; Ueda, E. (Nara Prefect. Inst. Public Health, Nara, Japan) **[Studies on residual degradation products of pesticides in agricultural products (II) change of ethylenethiourea during the preservation of agricultural products.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jpn.)* 19(4): 378-381; 1978. (13 references) (Japanese)

The residual amounts of ethylenethiourea (ETU) and ethylene bis dithiocarbamate on spinach plants to which zineb was applied as an aqueous suspension decreased as the temperature, at which the vegetable was preserved, increased. Under direct sunlight, the amount of ethylenethiourea decreased by half in 5 hr. Ethylenethiourea, taken into the plant body via the root system, was more stable than that applied on the plant during the storage. The degradation of ethylenethiourea in the bottled foods was more inhibited as the pH of the liquid decreased; ethylenethiourea in bottled tomato-puree did not decrease after 200 days of storage.

79-0055. Yaron, B. (Div. Soil Residues, Chem. Inst. Soils & Water, Agric. Res. Org., Bet Dagan, Israel) **Some aspects of surface interactions of clays with organophosphorus pesticides.** *Soil Sci.* 125(4): 210-216; 1978. (17 references)

This paper described the surface interactions of montmorillonite, kaolinite, and attapulgite clays with several organophosphorous pesticides. A review of the present knowledge in this field is presented, along with descriptions of recent investigations. Some of the factors affecting pesticide absorption by clays are temperature, the type of solvent in which the reactions occurs, and the hydration status of the clay. The mechanism of organophosphorus absorption by clays has been elucidated by infra-red studies on parathion. The infra-red spectra indicate that parathion coordinates through water molecules to metallic cations, and the main interaction is through the oxygen atoms of the nitro-group.

79-0056. Landa, E. A. (US Geol. Survey, Reston, VA 22092) **Soil water content and temperature as factors in the volatile loss of applied mercury (II) from soils.** *Soil Sci.* 126(1): 44-48; 1978. (16 references)

It has been shown that mercury can be volatilized from mercury- contaminated (mercuric chloride) soil, and the purpose of this study is to determine the effect of soil water content and temperature on this volatile loss of mercury. Soils were collected from five different sites and were amended to 1 ppm Hg. In the water content studies, samples were maintained at room temperature but at three different moisture levels: air-dried, 1/3 bar, and 80% saturated. The temperature studies involved samples at 1/3 bar moisture content, but maintained at three different temperatures; 10° C, 20°C and 35°C. After 38 days, the loss of mercury from the soil was monitored by radioassay. The results showed that the mercury losses were higher at 1/3 bar than at the other moisture levels. In the temperture studies, the mercury loss was reduced at 10°C as compared to room temperature, and was initially accelerated at 35°C. The results are consistent with an earlier suggestion that microorganisms may play a major role in the volatile loss of mercury from soils since the optimum conditions for soil microorganisms are 25-37°C and soil moisture content of 50-75% field capacity.

79-0057. Wahid, P. A.; Sethunathan, N. (Lab. Soil Microbiol., Cent. Rice Res. Inst., Cuttack 753006, India) **A simple method to study pesticide sorption in soils at short time intervals.** *Soil Sci.* 126(1): 56-58; 1978. (4 references)

An alternate method was developed for measuring pesticide sorption in soils. The conventional method, which involves centrifugation, has the disadvantage of a time lapse between shaking of the sample and quantification, which hinders the exact quantification of the pesticide sorbed at a given time. The filtration procedure described in this paper circumvents the problem of centrifugation and allows the pesticide sorbed to be measured at extremely sort time intervals, as little as 5 sec. Soil samples were dried and finely ground, then placed in aqueous solutions, were stirred on a magnetic stirrer for various time intervals, then 0.2 ml of the solution was withdrawn with a hypodermic needle fitted with a filter paper disc between the syringe and the needle. The radioactivity of the filtered solution was determined, with a correlation made for the sorption of parathion or BHC by the filter paper disc. The decrease in the radioactivity of the solution following stirring was attributed to soil sorption.

79-0058. Smith, S.; Willis, G. H. (USDA, Baton Rouge, LA 70893) **Disappearance of residual toxaphene in a Mississippi delta soil.** *Soil Sci.* 126(2): 87-93; 1978. (24 references)

The disappearance of residual toxaphene in different anaerobic soil environments was studied using Mississippi

delta field soil to which toxaphene had been applied over a period of several years. In Tutwiler silty loam soil 3.68 ppm toxaphene was found present as a residue. Essentially no toxaphene disappeared in moist aerobic soil systems. When alfalfa meal was used to amend the soil, little or no toxaphene disappeared, regardless of subsequent moisture treatment of gaseous environment into which the soil sample was placed. From 65 to 74% toxaphene disappeared from the moist anaerobic nitrogen samples, but toxaphene loss was greatest under flooded, stirred, anaerobic conditions where only 3.5 and 5.7% were recovered from the amended and unamended soils, respectively.

79-0059. Supak, J. R.; Swoboda, A. R.; Dixon, J. B. (Agric. Exp. Stn., Texas Agric. Extension Serv., Lubbock, TX 79409) **Adsorption of aldicarb by clays and soil organo-clay complexes.** *Soil Sci. Soc. Am. J.* 42(2): 244-248; 1978. (22 references)

An investigation was carried out to determine the amount of adsorption of aldicarb, an insecticidal carbamate, by clays and organo-clay complexes found in soils. The clay fraction of the test soils was separated out by centrifugation and decantation, and then saturated with Al or Ca. The organo-clay complexes wre isolated from the soils by a process involving ultrasonic vibration, filtration, and centrifugation. The clay and organo-clay complexes isolated were tested with aqueous solutions of S-methyl ^{14}C-labeled aldicarb in concentrations ranging from 2.08 to 62.40 ppm. The adsorbents were separated from the solution by centrifugation, and a liquid scintillation spectrometer was used to determine the quantity of ^{14}C remaining in solution. The montmorillonite samples showed negative adsorption for the entire concentration range, while the illite and kaolinite clays studied showed a small amount of positive adsorption. Although the findings suggest that aldicarb would not be adsorbed by montmorillonite soil, it is mentioned that the presence of organic matter would be expected to increase its pesticide adsorption capacity.

79-0060. Koster, P. B. (Inst. Ration. Suikerprod., Bergen op Zoom, The Netherlands) **The determination of residues of chlorinated hydrocarbons in dried sugar beet pulp and molasses.** *Sucr. Belge* 97(3): 91-95; 1978. (12 references)

Residues of chlorinated hydrocarbons were determined in dried sugar beet pulp and molasses. A gas chromatograhic method was used for analysis with a limit of detection ranging from 0.002 to 0.016, and from 0.0001 to 0.0008 mg of pesticide per kg material for dried pulp and molasses, respectively. The pulp and molasses products sampled were produced in Holland during recent beet campaigns. The organochlorine pesticide content of molasses was very low and never exceeded the limits for residue concentrations in that product. It was found that over a period of a few years the concentrations of lindane, heptachlor, and dieldrin were decreasing. In fact, for 1975 and 1976 detectable amounts of dieldrin and heptachlor could not be found. The use of aldicarb in place of lindane may partially account for the decrease in lindane residues observed.

79-0061. Pedersen, C. L.; Lohse, C. (Dep. Chem. Odense Univ., DK-5230 Odense M, Denmark) **Flash photolysis of 1,1-dichloro-2,2-bis(4-chlorophenyl)ethene (DDE) in the presence of oxygen. Formation of a highly unstable dioxetane.** *Tetrahedron Lett.* 34: 3141-3142; 1978. (6 references)

The photochemistry of DDE has been investigated and several reaction products identified. A flash photochemical study showed the formation of an intermediate later identified as the 1,2-dioxetane. Steady-state photolysis of DDE in benzene in the presence of air or oxygen gave photolysis of DDE in ethanol and cyclohexane. This compound was identified as 4,4′-dichlorobenzophenone. It was concluded from this study that 1,2-dioxetane, or a precursor of it, is formed in a reaction between excited DDE and ground state oxygen. This type of reaction appears to be unknown.

79-0062. Frank, R.; Braun, H. E.; Holdrinet, M.; Stonefield, K. I.; Elliot, J. M.; Zilkey, B.; Vickery, L.; Cheng, H. H. (Prov. Pestic. Residue Test. Lab., Ont. Minist. Agric. & Food, Guelph, Ont. Canada) **Metal contents and insecticide residues in tobacco soils and cured tobacco leaves collected in Southern Ontario.** *Tob. Sci.* 21: 74-80; 1977. (31 references)

A study was conducted to analyze tobacco soils and fluecured tobacco leaves for insecticide residues and metal contents. Soil and leaf samples were collected in the main tobacco growing counties of Ontario, Canada. The mercury content of the samples was determined by the cold vapor method, while other metals were determined by flameless atomic absorption spectroscopy. Gas chromatography was used to quantify the organochlorine and organophosphorous residues. The cadmium analysis showed the cadmium content in dried leaves to be ten times that in the soil samples, indicating that cadmium can accumulate in leafy crops. The level of copper, chromium, and lead in the leaves was significantly lower than that in the soil samples, suggesting low uptake from the soil. The insecticide analysis showed no organophosphorous residues in the leaves and only trace amounts in the soils. The HEOD dieldrin levels in both soil and leaves showed little change between 1970-1975, despite the fact that the insecticide was banned in 1969. The DDT analysis showed that after restrictions on its use, the residue levels declined more slowly in the soil than in the leaves.

79-0063. Teleugaliev, T. M. (Alma-At. Zool. Vet. Inst., Alma-Ata, USSR) **Veterinarno-sanitarnaya ekspertiza myasa otravlennykh khlorofosom ryb. [Veterinary hygienic study of the meat of fish poisoned with chlorophos.]** *Vestn. SKh. Nauki Kaz.* 20(9): 75-77; 1977. (Russian)

Organoleptic and biochemical parameters of fish muscle containing chlorophos (trichlorfon) and methods of detoxifying it for use as animal feed were studied. Fish meat contaminated with chlorophos was prepared by soaking it for 48 hr in a 0.05% solution of chlorophos (a.i. content in the stock solution 65%). The LD50 of chlorophos, administered by stomach tube, was 40-1000 mg/kg in the rat, 500-800 mg/kg in the mouse, and 180-240 mg/kg in the pig. Fish

muscle containing chlorophos at 6 mg/kg could be detoxified by boiling in a closed kettle under steam pressure for 2.5 hr. If an open kettle is used boiling should be continued for 3 hr. After such treatment the chlorophos levels are reduced sufficiently so that the fish could be fed to pigs up to 10 days before slaughter (reduction by 42% in the case of the open kettle and 79% in the case of a pressure cooker).

79-0064. Weigert, P. (Vet. Untersuchungsst., Bundeswehr VI, D-8000 Munich, Germany) **Zum Quecksilbergehalt von Gefluegelfleisch. [Mercury content of poultry meat.]** *Z. Lebensm. Unters. Forsch.* 166(6): 344-345; 1978. (8 references) (German)

The use of mercurial seed dressings entails the danger of mercury-contaminated feed being supplied to poultry. Therefore mercury levels were examined in muscle and fat from 101 frozen stewing chickens raised in Lower Bavaria and supplied to a caterer in Munich. After wet digestion of the tissue specimens, the mercury content was determined by cold flameless atomic absorption spectrometry. The mercury content in muscle averaged 0.004 ± 0.016 ppm, and in fat 0.001 ± 0.001 ppm (wet weight in both cases). The low values in fat indicate that the incorporated Hg is primarily present in non-alkylated form, since alkylmercury would tend to accumulate in lipid-containing tissue. In two of the muscle specimens the mercury contents exceeded the guideline value of 0.08 established by the German government. The remaining specimens were well below this value.

79-0065. Suess, A.; Fuchsbichler, G.; Eben, Ch. (Bayer. Landesanst. Bodenkult. & Pflanzenbau, Munich, Germany) **Abbau von Anilin, 4-Chloranilin und 3,4-Dichloranilin in verschiedenen Boeden. [Degradation of aniline, 4-chloroaniline and 3,4-dichloroaniline in various soils.]** *Z. Pflanzenernaehr. Bodenkd.* 141(1): 57-66; 1978. (9 references) (German)

The decomposition rate of aniline (A), 4-chloroaniline (B), and 3,4-dichloroaniline (C), the principal metabolites of phenylamide pesticides to CO_2 in 4 different agricultural soils present at a 1 ppm concentration was studied over a period of 10-16 wk. The benzene ring of the 3 compounds was labeled with ^{14}C; upon termination of the decomposition time (aniline 10 wk, other compounds, 16 wk) the (A) soils were extracted with water, the (B) soils with acetone and the (C) soils with ethylalcohol, and the extracts were analyzed by thin layer chromatography. (A) was mineralized over the 10 wk period by 16.2-26.3%. (B) was mineralized over 16 wk by 12.3-17.2%, and (C) by only 3.9-11.9% depending on the type of soil. Following the completion of the experiments, 60% or more of the ^{14}C activity remained in the soil undecomposed (adsorbed to soil constituents, linked covalently to organic soil components, or converted by condensation into secondary transformation products) and could not be extracted by any solvent. The slow degradation of these compounds may lead to their accumulation in agricultural soils.

See also 79-0118, 79-0140, 79-0159, *and* 79-0227.

79-0066. Savage, E. P.; Keefe, T. J. (Inst. Rural Environ. Health, Colorado Epidemiol Pestic. Stud. Cent., Colorado State Univ., Fort Collins, CO) **Hospitalized acute pesticide poisonings in agricultural workers.** *Am. J. Epidemiol.* 108(3): 242; 1978.

The trends from two national studies of hospitalized pesticide poisonings are discussed. Approximately 800 United States hospitals were included in both these studies of agricultural workers. National estimated rates of hospitalized pesticide poisoning cases, person-place-time characteristics, type of pesticide, and the type of exposure are discussed.

79-0067. Glass, R.; Lyness, R.; Mengle, D.; Powell, K.; Kahn, E. (CDC, Atlanta, CA 30333) **The gonadal toxicity of DBCP among male pesticide applicators.** *Am. J. Epidemiol.* 108(3): 242; 1978.

The serum gonadotropins (LH, FSH) and sperm counts from 96 pesticide applicators in California were studied to determine the effects of DBCP (dibromo chloropropane) on worker fertility. Infertility of the pesticide applicators was not a problem. A small, but significant decrease in the sperm count and an increase in FSH were associated with recent DBCP exposure. Depressed sperm counts were correlated with DBCP application practices such as irrigation and equipment calibration. Findings suggest the pesticide applicators exposure to DBCP was extensive enough to produce sperm count depression, but no clinical infertility.

79-0068. Clark, L.; Shy, C. M.; Portier, K. M.; Most, B. M.; Florin, J. W. (Univ. North Carolina, Chapel Hill, NC 27514) **Cancer mortality and agricultural activity; an association with cotton production and large farms in the southeastern United States.** *Am. J. Epidemiol.* 108(3): 242; 1978.

The association between geographic patterns of pesticide use and cancer mortality was studied using multiple regression techniques. Age, sex, and race specific mortality rates for individuals aged 30-69 years were calculated for cancer of the lung, colon, liver, hematopoietic system and all neoplasms. Rates were calculated both for each county and agricultural area in the southeastern United States. A health index of pesticide exposure, based on estimates of environmental pesticide usages, was used in a weighted multiple regression model with demographic variables to predict mortality rates. The index shows a statistically significant association for white males and females for total cancer and lung cancer in a geographic excess in the coastal plains of the southeastern United States.

79-0069. Morgan, D. P. (Inst. Agric. Med., Univ. Iowa, Oakdale, IA 52319) **A decade of experience in the epidemiology of occupational exposure to pesticides.** *Am. J. Epidemiol.* 108(3): 242; 1978.

The large scale epidemiological studies, started eleven years ago by federal agencies to determine the effects of pesticides on human health, have encountered problems. Principles of epidemiologic study were often ignored, and control of the studies proved to be cumbersome. Large volumes of data, including occupational, biochemical, and hematologic pesticide data were accumulated from the studies. Reanalysis of data suggests altered liver functions are associated with increased serum concentrations of storable chlorinated hydrocarbons. Recent studies include clinical studies of workers exposed to a limited spectra of pesticides, and a retrospective study of the health of earlier study participants.

79-0070. Morgan, J. P.; Penvich, P. (Dep. Pharmacol., Sch. Med., Univ. Rochester, Rochester, NY) **Jamaica ginger paralysis. Forty-seven year follow-up.** *Arch. Neurol. Chicago* 35(8): 530-532; 1978. (17 references)

Eleven men who were victims of paralysis arising from ingestion of jake (Jamaica ginger extract) adulterated with lindol (isomers of cresyl phosphate) were examined. These men had taken the liquid in the early 1930's, when various batches of jake were distributed containing 0.5 to 3% tri-*o*-cresyl phosphate (TOCP). Nine of the eleven had consumed jake prior to this time without any ill effects. All the victims of these adulterated batches suffered some degree of paresis of both upper and lower extremities, usually with foot drop and wrist drop with clawed hands. All experienced complete or nearly complete recovery of hand and arm function, but only one of the 11 was able to later walk without use of assisting implements. Only one suffered any type of impotency for a time after the illness. TOCP poisoning destructively involves anterior horn cells and corticospinal tracts in the cord. Most of the evidence indicates that destruction of myelin sheaths is associated with axonal death. While these subjects showed some signs of frontal release and mild dementia, these could be attributed to advanced aged and cerebrovascular atherosclerosis. However, it is suggested that there is a possibility that TOCP may also affect cerebral function. TOCP closely resembles modern organophosphate pesticides, although it has little utility as a pesticide itself.

79-0071. Hierons, R.; Johnson, M. K. (Brook Hospital, Shooters Hill, London SE18, England) **Clinical and toxicological investigations of a case of delayed neuropathy in man after acute poisoning by an organophosphorus pesticide.** *Arch. Toxicol.* 40(4): 279-284; 1978. (14 references)

Progressive neuropathy developed in a man during 2-8 wk after acute poisoning by a pesticide said to contain trichlorfon. The neuropathy was typical of that caused by organophosphorus esters in the delay and in the maintenance of normal conduction velocity in surviving nerve fibers. A sample alleged to be typical of the ingested material was not more active against hen brain neurotoxic esterase (NTE) than was pure trichlorfon. Delayed neuropathy has never been produced in hens by a single dose of trichlorphon. This incident and studies of human brain in vitro suggest that the ratio neurotoxicity/ lethality for trichlorfon is higher in man than in the hen. Suggestion is made of laboratory tests to improve neurotoxicity screening. (Author abstract by permission)

79-0072. Wright, N.; Yeoman, W. B.; Hale, K. A. (Dudley Road Hosp., Birmingham B18 7QH, England) **Assessment of severity of paraquat poisoning.** *Br. Med. J.* 2(6134): 396; 1978. (3 references)

A correlation is reported between the clinical outcome of paraquat poisoning and the urinary excretion rate of the chemical. Studies were made over a two year period of 16 individuals who had taken paraquat in suicide attempts. It is indicated that a high mortality is associated with excretion rates of over 1 mg/hr more than 8 hr after ingestion. Neither hemoperfusion nor forced diuresis affected the excretion rate appreciably.

79-0073. Tuchmann-Duplessis, H. (Lab. Embryol., U.E.R., Biomed. Saints-Peres, F-75006 Paris, France) **L'accident de Seveso; donnees actuelles sur le developpement pre-et post-natal. [The Seveso accident: present data on the human pre- and postnatal development.]** *Bull. Acad. Nat. Med.* 162(389-394; 1978. (3 references) (French)

Evaluations were made of available epidemiological data on the abortion rate, teratogenic potential, and postnatal development of children of mothers exposed to atmospheric TCDD after the explosion of a chemical reactor at Seveso, Italy. The population under study comprised 623 pregnant women exposed to approximately 20 $\mu g/m^2$ dioxin in zone A and 4 $\mu g/m^2$ in zone B. No specific prenatal disturbances or abnormal postnatal mortality occurred and the children, now more than a year old, exhibit no harmful effects due to the exposure of their mothers. While the malformation incidence rate for 1977 (the explosion occurred in July 1976) was 1.36%, and that of the preceding year only 0.13%, it was well below the norm for western countries (2.5 to 3%). This absence of harmful effects is attributed to a lower susceptibility of the human embryo than of rodents to dioxin and to the low dioxin concentration in the contaminated area.

79-0074. Andrews, J. H.; Kenerly, C. M. (Dep. Plant Pathol., Univ. Wisconsin, Madison, WI 53706) **The effects of a pesticide program on non-target epiphytic microbial populations of apple levels.** *Can. J. Microbiol.* 24(9): 1058-1072; 1978. (47 references)

The epiphytic microbial community was quantitatively and qualitatively altered when a standard pesticide schedule that comprised applications of an insecticide (azinphos-methyl), a bactericide (streptomycin), and a fungicide (zineb ethylene thiuram disulfide adduct) was applied to McIntosh apple trees. Effects on non-target organisms were observed for two seasons by three indirect methods and three direct methods: light microscopy, scanning electron microscopy, and isolation of propagules from leaves incubated in humidity chambers. Magnitude of reduction of bacteria, filamentous fungi, yeasts, and actinomycetes varied annually and between categories of microflora. Populations from treated leaves were reduced 10- to 1000-fold in 1976 and up to 50-fold in 1977. Qualitatively, fluorescent pseudomonads and lactic acid-type bacteria were among those depressed by pesticide. Fungal populations on treated leaves were less diverse than on control leaves. *Aureobasidium* was only slightly affected and incidence of *Sporobolomyces* was substantially higher on treated leaves than on controls. The results suggest that numbers of antagonists to foliar pathogens of apple which may occur as part of the natural epiphytic microbial community may be reduced by current pesticide programs and hence have possible implications for the development of biological approaches to integrated control strategies. (Author abstract by permission)

79-0075. Pollack, J. D.; Hughes, J. H.; Hamparian, V. V.; Burech, D. (Dep. Med. Microbiol., Ohio State Univ., Columbus, OH) **The interaction of chemicals and viruses and their role in Reye's Syndrome.** *Chemosphere* 7(7): 551-563; 1978. (77 references)

A review of the literature is presented on the interactions between environmental contaminants (including several pesticides) and viruses in several *in vitro* and *in vivo* experiments. Tissue cultures of HeLa cells treated with dicofol, DDT, and dinocap have been shown to produce increased replication of poliovirus when compared to control HeLa cultures. In rabbit kidney cultures, DDT treatment yielded vaccinia viral replicates six times greater in number than those of control cultures. The causative virus of foot and mouth infection in swine was replicated in greater numbers in swine tissue cultures after exposure of the cultures to dimethoate. Increased vesicular stomatitis viral replicates were also noted in L-929 and HeLa tissue cultures treated with fenitrothion and Toximul MP8, respectively. Cases of synergism in insects between granulosis virus and DDD (TDE) or malathion, polyhedrosis virus and DDT, TEPP, toxaphene, parathion, endrin, trichlorfon, endosulfan, fenitrothion, or rotenone have also been observed in various species. In animal studies, hepatitis viruses in ducks and mice have been synergized in their toxic effects by DDT and strychnine, respectively. Dieldrin and fenitrothion gave similar effects in animal viral synergism studies, while lindane and PCBs showed no synergistic effects. Studies on the human malody of unknown etiology, Reye's Syndrome, have named such toxins as warfarin, isopropyl alcohol, lindane, salicylates, antihistamines, decongestants, unidentified paints, and pesticides as causative agents. Present research on the hepatic tissue of nine children with Reye's Syndrome has shown that the environmentally toxic fungicide aflatoxin as not present in the liver. Examination of 12 Reye's Syndrome patients for pseudocholinesterase activity revealed no significant inhibition of this enzyme. It was concluded from these tests that pseudocholinesterase inhibiting insecticides in the environment should be excluded from the list of suspect causative agents for Reye's Syndrome.

79-0076. Bagnell, P. C.; Crocker, J. F. S.; Ozere, R. L. (Dep. Pediat., Dalhousie Univ., Halifax, Nova Scotia) **Reye's Syndrome in Canada's maritime provinces.** *Chemosphere* 7(7): 565-571; 1978. (18 references)

The recent increase in the number of cases of Reye's Syndrome had led to the investigation for possible chemical inducement of the disease. Epidemiological, geographical,

and pathological studies were conducted by the national Reye's Syndrome study group, concentrating on the area of Eastern Canada. Rural cases of the syndrome were found to be three times more frequent than urban cases, often with clustering occurring in specific geographical regions at similar times, as evidenced by the outbreak of Reye's Syndrome in the maritime Canadian provinces. Although it is believed that no single chemical is responsible for the malady, groups of chemicals may have the ability to increase susceptibility to the disease. Two common factors were noted in the Eastern Canada studies, the exposure of patients to salicylates, and geographical clustering contiguous to areas of forest spraying with various formulations including insecticides. It is suggested that environmental factors may alter cellular responses to viral infection, and increase the susceptibility of the individual to Reye's Syndrome. The possible role of genetic predisposition in relation to Reye's Syndrome is also discussed.

79-0077. Ecobichon, D. J.; Crocker, J. F. S. (Dep. Pharmacol., Dalhousie Univ., Halifax, Nova Scotia, Canada) **Depression of blood cholinesterases as a marker of spray exposure.** *Chemosphere* 7(7): 591-596; 1978. (12 references)

Spraying of large tracts of New Brunswick forests with fenitrithion (140-280 g/ha) may be correlated to outbreaks of Reye's Syndrome. It had been noted that individuals in regions subjected to large scale spraying have decreased plasma pseudocholinesterase and erythrocyte acetylcholinesterase activities. Comparisons of these activities for two groups of 50 school children from sprayed and unsprayed regions were made to determine possible differences. Plasma pseudocholinesterase levels, measured spectrophotometrically, showed no significant differences between the rural and urban groups. Eythrocyte acetylcholinesterase levels, measured titrimetrically, also showed no significant differences between the groups. The use of these plasma cholinesterase activities as a method of identifying possible environmental risks in relation to Reye's Syndrome is not conclusive.

79-0078. Muehlendahl, K. E.; Etzold, R.; Krienke, E. G. (Berat. Vergiftungserscheinungen, Univ. Kinderklin, D-1000 Berlin 19, Germany) **Thaliumvergiftungen im Kindesalter. [Thallium poisoning in children.]** *Dtsche. Med. Wochenschr.* 103(27): 1116-1117; 1978. (1 reference) (German)

The toxic effects of thallium poisoning in 75 children, most between 1 and 4-yr-old, caused by accidental ingestion of the rodenticide Zelio were evaluated. Of these, 73 children with urinary thallium concentrations from 20 to 500 μg/l thallium exhibited no symptoms. One child, who ingested 3.5 mg/kg thallium and had a maximum urine concentration of 130 μg/l, lost patellary and Achilles tendon reflexes two weeks following the accident. Another child with a urine level of 3900 μg/l and a blood level of 40 μg/l lost all hair during the second week following the accident. In addition, the cases of 2 children are reported who died following ingestion of peas impregnated with thallium meant as a pigeon poison. Thallium poisoning cannot be accurately diagnosed from early symptoms. When it is suspected, forced diuresis must be continued until the urine concentration is reduced to a level below 500 μg/l.

79-0079. Spiridonova, V. S.; Shabalina, L. P. (Med. Inst., Moscow, USSR) **Toksikologiya talliya i ego soedinenii (Obzor literatury). [Toxicology of thallium and its compounds. A review of literature.]** *Gig. Tr. Prof. Zabol.* (7): 41-43; 1978. (15 references) (Russian)

The literature of the acute and chronic toxicity of thallium and its compounds in connection with occupational and non-occupational poisonings is reviewed. Most non-occupational poisonings are due to thallium-containing rodenticides and insecticides. Poisoning may be due to ingestion, skin resorption, and inhalation. Thallium accumulates in the body, especially in the thyroids, salivary glands, and hairs. The LD50 of thallium compounds in animals ranges from 18-39 mg/kg, LD100 18-92 mg/kg, and the maximum lethal dose is 7-29 mg/kg. In man, the LD50 for thallium is 6-40 mg/kg. Paresthesia of the distal parts of the limbs and around the mouth, chest pains, tremor, dyspnea, abdominal pains, Guillair-Barr syndrome, and polyneuritis are the common symptoms of acute thallium poisoning. Prussian blue is considered the best antidote of thallium intoxication.

79-0080. Dovzhanskii, S. I.; Ardentov, N. N.; Yakubovskaya, T. Yu.; Suvorov, A. P.; Orkin, V. F. (Med. Inst., Saratov, USSR) **Dermatozy u rabotnikov sel'skogo khozyaistva. [Dermatoses in farm workers.]** *Gig. Tr. Prof. Zabol.* (7): 47-48; 1978. (3 references) (Russian)

One hundred thirty-eight farm workers of the Saratov area were treated for dermatoses during a 5-yr period. They included 108 men and 30 women in the age bracket of 16-68 yr. The skin diseases diagnosed were allergic dermatitis, eczema and neurodermatitis in 32 cases, psoriasis in 28, collagenosis and photodermatosis in 27, mycosis in 10, and reticulosis in 9. Contact with pesticides and fertilizers was a major cause of allergic dermatitis and eczema, especially among tractor drivers.

79-0081. Heritage, J. (Author address not given) **Major American toxics disasters.** *EPA J.* 4(8): 8-10; 1978.

Adverse effects on human health and well-being caused by four chemicals, TCDD (dioxin), Tris, DBCP, and PCB's, are cited as examples of incidents which the 1977 Toxic Substances Control Act is intended to prevent. The incident in which TCDD was sprayed in a horse arena in Missiouri, resulting in illness in a child and the death of numerous animals and birds, exemplifies the consequences of ignorance and inadequate toxic substances regulation. In the case of DBCP (dibromochloropropane), data indicating that it was potentially dangerous had been available for years in the scientific literature, but did not receive public attention until sperm abnormalities were discovered in production workers. PCB pollution is widespread, insidious, and stable. The philosophy of preventive action embodied in the 1977 Toxic Substances Control Act gives the EPA authority to

require additional testing and even to control the use of substances already on the market. It sets up new precautions and imposes major penalties in case of violations.

79-0082. Anonymous. **Trial of a herbicide - a cautionary tale.** *Int. Pest Control* 20(4): 17-18; 1978.

Abnormal births reported in North Queensland and eastern Victoria are charged to the use of 2,4,5-T. This herbicide is used mainly to control woody weeds in forestry locations. Garden formulations are also available. The presence of the impurity TCDD is the chief cause for current concern. After the charge was made, consideration was given to all available evidence and known reports of both 2,4,5-T and 2,4-D formulations. The outcome of the investigations was that in both Australia and the United Kingdom, no findings suggested that the rate of abnormal births was any higher in areas where 2,4,5-T had been sprayed than in areas where it had not been used. Thus it was stated that there is at present no known reason for banning or even discouraging the use of these chemicals.

79-0083. Anonymous **Paraquat poisoning.** *J. Irish Med. Assoc.* 71(10): 326-327; 1978. (4 references)

In Ireland a recent increase in deaths by paraquat poisoning has been reported. That more cases are suicidal in recent years than in the past is noted. In many cases a great increase in the amount of paraquat ingested has been observed. It is suggested that one possible means of reducing the number of fatal cases and increasing the number of cases which may benefit from therapy would be to market the pesticide in more diluted forms. This would, of course, have to be a decision reached by the legal and manufacturing concerns of the country. Such dilution would not only decrease the amount available for poisoning; it might also lessen the corrosive effect of Gramoxone on the upper tract of the gastrointestinal system and, perhaps, thus reduce the amount of paraquat absorbed.

79-0084. Fitzgerald, G. R.; Barniville, G.; Black, J.; Silke, B.; Carmody, M.; O'Dwyer, W. F. (Dep. Med., Jerves Str. Hosp., Dublin 1, Ireland) **Paraquat poisoning in agricultural workers.** *J. Irish Med. Assoc.* 71(10): 336-342; 1978. (11 references)

Results are reported of a clinical study of 13 cases of paraquat poisoning occurring in agricultural workers. Six of the cases were fatal. Enquiries were also made at poison control centers for information on additional cases of agricultural workers poisoning by paraquat. A total of 304 reports were made during the period 1967 to 1976. Of these, 67 were concerned with accidents which occurred during agricultural use of the chemical. In addition 4 cases of splashing of concentrate into the eyes, 7 cases of dermatological burns, and 4 cases of oral lesions were caused by either sucking or blowing on the spraying apparatus or hand to mouth contact. Factors contributing to poisoning include spraying into the wind, leaky spraying apparatus, splashing of concentrate before dilution, inadequate dilution of the concentrate, carelessness in personal hygiene, incorrect apparatus, and spraying within a confined indoor space. Widespread disregard of elementary safety precautions among spray-operators was noted. Suggestions for amending labels on Gramoxone containers are offered.

79-0085. Anonymous **Liver cancer linked to dioxin.** *New Sci.* 78(1103): 431; 1978. (1 reference)

Increases in liver cancer, spontaneous abortions, and birth defects are being blamed on dioxin, a defoliant used during military operations in Vietnam. While studies of these conditions prior to the use of the chemical are lacking, premature ageing noted in children living in the identified areas is being used as a sign of chromosome damage. Compensation is being sought by American Vietnam veterans for symptoms, ranging from skin rashes to birth defects occurring in their children, which are thought to be dioxin-exposure related.

79-0086. Emsley, J. (Kings Coll., London, England) **The trouble with thallium.** *New Sci.* 79(1115): 392-394; 1978.

The history of the discovery and use of thallium is outlined. Thallium was isolated in 1862. Chemically monovalent thallium resembles the alkali metals, particularly potassium, and trivalent thallium is similar to aluminum. Thallium acetate was used medically as an depilatory agent, a use which resulted in several deaths, since the depilatory dose is close to the lethal dose of 12 mg/kg. The medical use of thallium acetate continued until after World War II. Thallium sulfate has been used as a rodenticide, and ingestion of the tasteless baits by children has resulted in several deaths and a larger number of nonfatal poisonings. Thallium poisoning is difficult to diagnose, since a wide spectrum of symptoms, easily mistaken for those of other diseases, may be manifested. The availability of thallium rodenticide has also resulted in its use for suicidal and homicidal purposes. Thallium compounds are currently undergoing a revival of interest as chemical reagents.

79-0087. Strik, J. J. T. W. A. (Dep. Toxicol., Agric. Univ., Wageningen, The Netherlands) **Porphyrins in urine as indication for exposure to chlorinated hydrocarbons.** *N. Y. Acad. Sci. Sci. Week;* 1978.

Studies on porphyrin content and patterns in urine were performed on workers producing hexachlorocyclo pentadiene (BHC), alylchloride, epichlorhydrin or endrin showed no porphyrin alterations. Two groups of farm families exposed to PBB (one in Michigan, one in Wisonsin) showed no significant differences between total urine porphyrins. Altered patterns indicative of copro porphyrinuria and chronic hepatic porphyria type A were observed in 47% of the Michigan group and 6% of the Wisconsin group. The porphyrin content and pattern of urine of Yusho patients were similar to Japanese controls. People exposed to TCDD in Seveso, Italy, had total urinary porphyrins similar to controls, but abnormal porphyrin patterns as revealed by TLC.

The conclusions of the study were that total urinary porphyrin less than 200 μg/l cannot be used to indicate exposure to porphyrinogenic chlorinated hydrocarbons, but that porphyrin patterns can be used as indicators of exposure.

79-0088. Kozler, M. (Author address not given) **Paraquat a Diquat. [Paraquat and Diquat.]** *Prac. Lek.* 30(1-2): 61-64; 1978. (29 references) (Czech)

The herbicidal properties of paraquat, its absorption by humans and subsequent poisoning, its clinical manifestations and chronic effects (LD50) and its effects on the skin as well as standards for manufacture and use are reviewed. The phytotoxic mechanism of paraquat is based on the production of the peroxide radical by interaction with chlorophyll. Absorbed in the digestive tract at most by 10%, paraquat is usually eliminated. However, severe poisoning cases have been recorded. The toxic symptoms include vomiting, abdominal pain and diarrhea, followed by kidney malfunction, liver damage and interstitial pulmonary edema. Carcinogenic effects have not been proven. Diquat poisoning symptoms are similar to those of paraquat with the exception of the effect on the respiratory system. Contamination of the hands by paraquat usually results in the loss of fingernails. There is no known antidote to paraquat intoxication. Animals fed 0.03% paraquat solutions developed pulmonary fibrosis. The LD50's are: for rats and rabbits, 130 mg/kg; for guinea pigs, hares and cows, 30 mg/kg; and for dogs, 25 mg/kg. The LD50 for humans is reported to be approximately 10-30 mg/kg.

79-0089. Ohsawa, M.; Naruse, K.; Inoue, S.; Furukawa, T.; Maruyama, K. (Sch. Int. Med., Tokyo Women's Coll. Med., Tokyo, Japan) **A case of intention myoclonus by intoxication due to methyl bromide.** *Clin. Neurol. (Tokyo) (Rinsho Shinkeigaku)* 18(7): 443; 1978. (Japanese)

A 27-yr-old woman was exposed to methyl bromide and developed an an intention or action myoclonus with clonic systemic spasm of the upper right arm. The myoclonus remained after disappearance of the spasm, and was not improved by left thalamotomy of the Vimnucleus. High urine concentrations of bromine (28.6 mg/dl), reduced 5-HT in blood and reduced 5-HIAA in the cerebrospinal fluid were noticed, however HVA in the fluid was normal. Administration of 8 mg of clonazepam reduce the myoclonus remarkably. However, those of 700 mg of L-5-HTP with 70 mg of carbidopa, did not improve the condition satisfactorily. Side effects of clonazepam were noted. The concentration of 5-HIAA showed no change after the 8 mg dose and showed a small increase after administration of the 700 mg dose.

79-0090. Ahling, B.; Lindskog, A. (Swedish Water & Air Pollut. Res. Inst., Stockholm, Sweden) **Thermal destruction of PCB and hexachlorobenzene.** *Sci. Total Environ.* 10(1): 51-59; 1978. (16 references)

The effects and risks resulting from the thermal destruction of PCB and hexachlorobenzene were investigated. A pilot incineration plant was used for the experimentation. Results of the study indicate that PCB can be destroyed by incineration if the transit time is long enough. PCB residues of less than 100 mg/kg were recorded when the transit time was more than 2 sec. There did not appear to be a relationship between the temperature of the incinerator and the success of the operation. When PCB is incinerated, hexachlorobenzene (HCB) is formed. This formation increases at high temperatures. In order for the hexachlorobenzene to be destroyed, a temperature of 950°C is needed. This will result in the formation of a residue less than 100 mg HCB/kg. At 800°C and a transit time of 2 sec a residue of about 1200 mg/kg remains.

79-0091. Daun, H. (Nervenklin. & Poliklin., Univ. Erlangen, Erlangen, Germany) **Toxische Polyneuropathien. [Toxic polyneuropathies.]** *Therapiewoche* 28(24): 4895-4901; 1978. (25 references) (German)

Clinical symptoms, causes (frequently drug-related), incidence, diagnosis and therapy of toxic degeneration of the nervous system are reviewed. The most frequent manifestations include damage to the peripheral nervous system and idiopathic polyneuropathy. Among the exogenic causes of polyneuropathies are, for example, alcohol, arsenic, many organic chemicals, and drugs including cytostatics, antibiotics, psychodrugs, and transquilizers. Endogenic polyneuropathies occur in diabetes. The clinical symptomatology of polyneuropathy caused by the alkaloid Vincristin, by nitrofurantoin, isoniazine, thalidomide, Metaqualon, alcohol, thallium, lead, carbon disulfide, tri-*o*-cresyl phosphate and the endogenic forms accompanying diabetes, porphyrism, diphtheria, and botulism are described. The two-step diagnostic procedure includes topical and etiological diagnosis. Endogenic intoxication can be detected by metabolic tests and traced to infection of the respective toxin, exogenic causes can be revealed by questioning. The best therapy in exogenic polyneuropathy is prevention; is acute cases antidotes and extracorporeal dialysis are used. Endogenic polyneuropathies accompanying diabetes can be prevented by diet, in other instances by drugs, antitoxic sera, antithrombotic and antiembolic therapy.

79-0092. Okun'kov, P. S. (USSR Minist. Agric., Moscow, USSR) **Dopustimye ostatochnye kolichestva pestitsidov v kormakh. [Permissible pesticide residue levels in feed.]** *Veterinariya (Moscow)* (7): 85; 1978. (Russian)

Maximum permissible pesticide residue levels in animal feeds are given. Zero tolerance has been established for aldrin, dieldrin, heptachlor, dinitro- *o*-cresol (DNOC), arsenicals, mercurials, and TMTD, as well as for metaphos (methyl parathion), polychlorocamphene and polychloropinene in feeds for milking cows and laying hens. The maximum permissible levels set are: 0.05 mg/kg for DDT; 2 mg/kg for anthio (formothion); 1 mg/kg for atrazine, methylmercaptophos, and carbaryl; 3 mg/kg for butyphos; 0.1 and 0.6 mg/kg for 2,4-D (in feeds for milking cows and laying hens, and for masted animals, respectively), and 35 mg/kg for inorganic bromides.

79-0093. Malen'kii, V. P. (Dep. Hosp. Ther. I, Vinnitsa Med. Inst., Vinnitsa, USSR) **Kliniko-immunologicheskaya kharakteristika khronicheskoy pnevmonii u mekhanizatorov sel'skogo khozyaistva. [Clinical-immunological characteristics of chronic pneumonia in farm equipment operators.]** *Vrach. Delo* (6): 53-56; 1978. (5 references) (Russian)

The clinical and immunological status of 72 farm equipment operators (tractor drivers) with chronic pneumonia was studied. Most patients were over 40 yr, and the average length of employment exceeded 10 yr. Grade I pneumonia was diagnosed in 23 patients, Grade II in 42, and Grade III in 7. The symptoms included dry cough in 43 patients, productive cough in 30, vesiculous respiration in 27, pleural murmur in 2, and restricted mobility of the pulmonary borders in 18. The blast transformation of the lymphocytes was significantly reduced in the patients with Grades II and III pneumonia ($p < 0.001$ and $p < 0.05$, respectively), and so was the spontaneous rosette formation in these two groups ($p < 0.001$), while the neutrophil damage index was increased significantly in all patients ($p < 0.001$). While the total serum protein level was about the same in the controls, the albumin fraction was reduced in the patients. The findings indicate the impairment of the immune status in chronic pneumonia, and indirectly the adverse effect of the combination of high temperature and inhaled pesticides on the respiratory tract.

79-0094. Werner, E.; Meyer, P.; Thiele, E. (Hals Nasen Ohrenklin., Ernst Moritz Arndt Univ., DDR-22 Greifswald, DDR) **Untersuchungen an den Schleimhaeuten des oberen Respirations-traktes und am Parotisspeichel bei Werktaetigen der Landwirtschaft nach Exposition gegenueber Agrochemikalien. [Examinations of the mucous membranes of the upper respiratory tract and of parotid secretion of people working in agriculture after exposure to agrochemicals.]** *Z. Gesamte Hyg. Ihre Grenzgeb.* 24(5): 335-337; 1978. (16 references) (German)

Cross and longitudinal sections of mucous membranes of the upper respiratory tract and the saliva of 97 individuals exposed to insecticides were examined to determine changes induced by their inhalation. The mucous membrane was subjected to clinical and X-ray examination, the saliva to clinical and sialochemical examination, the protein pattern was determined by discelectrophoresis and quantitative microdensitometry. Of the group under study 26 individuals exhibited marked hyperplastic changes of the nasal mucous membrane and increased watery discharge, in 4 cases fibrinous atrophic symptoms were observed, in 24 cases the secondary nasal cavity was involved and in 6 individuals the frontal sinuses. The saliva calcium level was reduced and the disc electrophoretic protein pattern exhibited some changes; a causal relationship between these two observations is suspected. The introduction of prophylactic measures is discussed.

See also 79-0019, 79-0047, 79-0182, *and* 79-0227.

79-0095. Burzynska, H.; Maciejska, K. (Dep. Food Res., Natl. Inst. Hyg., Warsaw Poland.) **The effect of some contaminants occurring in food on the growth of *Aspergillus flavus* and the production of aflatoxins.** *Acta Aliment. Pol.* 4(28): 119-127; 1978. (19 references)

The effects of food residues of DDT, HCH (BHC), thiuram, carbaryl, methoxychlor and dichlorvos on growth and aflatoxin production of toxigenic *Aspergillus flavus* strains were investigated. DDT at 2 μg/ml stimulated the growth of *A. flavus* VIII and *A. parasiticus* NRRL-2999, and increased by 30% the aflatoxin B1 production of strain *A. flavus* VIII, and by 100% the aflatoxins B1 and G1 production of strain *A. flavus* NRRL-3145. Other pesticides impaired the growth and decreased the production of aflatoxins. Thiuram at 3 μg/ml stimulated growth and decreased from 2 to 5 times the production of aflatoxin B1 by both *A. flavus* VIII and *A. parasiticus* NRRL-2999 strains. Carbaryl, at doses in the study, decreased the production of aflatoxin without any appreciable effect on growth. HCH at 0.5 μg/ml reduced the production of aflatoxins by both strains 1.5 to 2 times. At a 10 times stronger dose it decreased aflatoxin B1 production and also inhibited strain growth. Methoxychlor impaired production of aflatoxins only in strain *A. flavus* NRRL-3145. Dichlorvos, at 20 μg/ml, decreased by 10 times the production of aflatoxins B1 in Strain *A. flavus* VIII while showing no effect on growth.

79-0096. Dalela, R. C.; Verma, S. R.; Bhatnagar, M. C. (Unit. Pollut Relevant Res., Dep. Zool., D.A.V. Coll., Muzaffarnagar, India) **Biocides in relation to water pollution. Part I: Bioassay studies on the effects of a few biocides on fresh water fish, *Channa gachua*.** *Acta Hydrochim. Hydrobiol.* 6(1): 15-25; 1977. (35 references)

The effects of four biocides, endrin, thiodon (endosulfan), malathion, and phosvel (leptophos) on the fresh water *Channa gachua* were studied. Randomly selected groups of fish were exposed to seven different concentrations of each biocide for time intervals of 24, 48, 76, and 96 hr. The median tolerance limit (TLm) of each of the four compounds was obtained. The TLm values for 96 hr ranged from 0.0068 mg/l for endrin, making it the most toxic, to 31.15 mg/l for phosvel, which was the least toxic. The TLm values for thiodon and malathion ranged from 0.01064 to 0.01120 and from 7.60 to 9.20 mg/l, respectively. In addition, it was noted that both increase in temperature and increase in pH caused an increase in toxicity of the biocides.

79-0097. Aldridge, W. N. (Med. Res. Counc. Toxicol. Unit, MRC Lab., Surrey, England) **The influence of organotin compounds on mitochondrial functions.** *Adv. Chem. Ser.* 157: 186-196; 1978. (43 references)

The biological activities of some organotin compounds are discussed. Tetraorganotin compounds have no direct action on mitochondria, and *in vivo* are rapidly converted to triorganotins. Diorganotins inhibit the oxidation of α-ketoacids through an affinity for dithiols. Triorganotins cause a rapid fall in body temperature and an increase in water in the brain in mammals. Triorganotins disturb mitochondrial function in three different ways: secondary responses caused by the discharge of hydroxyl-chloride gradients across membranes; interaction with mitochondrial membranes causing disruption and swelling; or by interaction with basic energy conservation systems involved in the synthesis of ATP. Examples of the processes leading to inhibition of ATP synthesis are described.

79-0098. Fish, R. H.; Kimmel, E. C.; Casida, J. E. (Pestic. Chem. & Toxicol. Lab, Dep. Entomol. Sci., Coll. Nat. Resour., Univ. California, Berkley, CA 94720) **Bioorganotin chemistry: biological oxidation of organotin compounds.** *Adv. Chem. Ser.* 157: 197-203; 1978. (22 references)

The primary biological oxidation reaction of organotin compounds appears to be the hydroxylation of the carbon-hydrogen bonds that are α, β, γ, and δ to the tin atom. Destannylation plays a secondary oxidation role. Studies of monooxygenase systems of mammals were used to study the organotin oxidation process. The specific oxidation paths of the organotins, *n*-alkyltin compounds, cyclohexyltin compounds and triphenyltin compounds, are discussed. Oxidation occurrs by a free radical pathway, accounting for the predominance of β- and α-carbon-hydroxylation compounds. A suitable model for the P450-dependent monooxygenase system is needed for further study.

79-0099. Selwyn, M. J. (Sch. Biol. Sci., Univ. East Anglia, Norwich NR4 7TJ, England) **Triorganotin compounds as ionophores and inhibitors of ion translocating ATPases.** *Adv. Chem. Ser.* 157: 204-226; 1978. (48 references)

Triorganotin compounds inhibit the electron transport phosphorylation in mitochondria, chloroplasts and bacteria. This inhibition effect is especially noticeable in the more hydrophobic triorganotins such as triphenyltin and tributyltin. Inhibition takes place on the membrane-bound components of coupling ATPase. Triorganotins inhibit the proton flow through these membrane-bound components, as well as the Ca^{2+}-translocating ATPases of sarcoplasmic reticulum, and the Na^{+}-K^{+}-ATPase of cell membranes. Triorganotins are ionophores, allowing the exchange of Cl^{-}, SCN^{-}, I^{-}, Br^{-}, and F^{-} ions for OH^{-} ions across biological and artificial membranes. Chlorine rich media allows the Cl^{-} OH^{-} exchange which causes clamping of pH differences across membranes. The Cl^{-}/OH^{-} exchanges cause shifts in the pH optima of enzymes, enhanced ion movements, and uncoupling of electron transport phosphorylation.

79-0100. Rappaport, R.; Schweisguth, O.; Cachin, O.; Pellerin, D. (Clin. Mal. Rein & Metab., Hop. Enfants-Malades, F-75730 Paris Cedex 15, France) **Corticosurrenalome malin avec metastases. Exerese et traitement par *o,p'*-DDD suivi de guerison. [Malignant cortical suprarenaloma with metastases. Excision and treatment with *o,p'*-DDD followed by recovery.]** *Arch. Fr. Pediatr.* 35(5): 551-554; 1978. (5 references) (French)

A 6 year old child, following excision of a maligant metastasizing adrenal tumor, was treated for 5 yr with 2g/day *o,p'*-DDD (TDE, Mitotane, dichloro diphenyl dichloroethane) supplemented by steroid therapy. The absence of recurrence over a 12 yr period indicates that a cure was achieved. The comparatively low *o,p'*-DDD dose was dictated by tolerance but apparently an adequate blood level was achieved. The metastases in the lungs and the liver disappeared after a few months of treatment; the biochemical changes accompanying clinical regression are described. Puberty started normally at the age of 9 yr 9 mo. Still, the role played in this case by *o,p'*-DDD remains in question.

79-0101. Koss, G.; Seubert, S.; Seubert, A.; Koransky, W.; Ippen, H. (Inst. Toxikol. & Pharmakol., Philipps Univ., D-3550 Marburg, Germany) **Studies on the toxicology of hexachlorobenzene. III. Observations in a long-term experiment.** *Arch. Toxicol.* 40(4): 285-294; 1978. (14 references)

The pharmacokinetics of hexachlorobenzene and its metabolites, as well as its influence on the clinical behavior of female rats, their weight increase, organ weight, and porphyrin metabolism were investigated over a period of 53 wk. From the 1st through the 15th wk of the experiment, hexachlorobenzene was given po to the animals at a dose of 178 μM/kg (50 mg/kg) every other day. Nine wk after the start of the experiment, an equilibrium was observed between intake and elimination of hexachlorobenzene and its metabolites. At this time, 1 g of liver contained approximately 1 μM of hexachlorobenzene, 50 nM of pentachlorophenol (PCP), 5 nM of tetrachloro hydroquinone and approximately 0.1 nM of pentachloro thiophenol. The elimination of hexachlorobenzene took place at a decreasing rate. Thirty-eight wk after cessation of administration, the biological half-life, determined on the basis of the substance eliminated from the tissues, amounted to 4-5 mo. The increase in body weight of the treated animals did not differ during the entire course of the experiment from that of untreated animals. During the period of treatment, the liver, spleen, kidneys and adrenal glands showed a relative increase in weight. At the end of the 38 wk period, in which no hexachlorobenzene was administered, the organs of the treated animals exhibited normal weights. The content of porphyrins in the liver and urine, and that of δ-aminolevulinic acid and porphobilinogen in the urine increased up to the 15th week of the experiment. At the end of the 38-wk period (during which no hexachlorobenzene was given), the porphyrin content of the liver was higher than after the 15 wk period of administration, but the porphyrin content of the urine had decreased to almost normal values. The amount of porphyrin precursors in the urine had likewise reached normal values. (Author abstract by permission)

79-0102. Ackermann, H.; Faust, H.; Kagan, Y. S.; Voronina, V. H. (Res. Cent. Mol. Biol. & Med., Cent. Inst. Nutr., Acad. Sci. DDR, Potsdam-Rehbruecke, DDR) **Metabolic and toxic behaviors of phthalimide derivatives in albino rat. II. Placental passage of chloromethyl phthalimide, oxymethyl phthalimide, and phthalimide- their fetal metabolism.** *Arch. Toxicol.* 40(4): 255-261; 1978. (5 references)

Chloromethyl phthalimide, oxymethyl phthalimide, and phthalimide are absorbed by the albino rat at a comparatively high rate. Only phthalimide, the metabolic product, will be recordable from fetuses, following oral administration of chloromethyl phthalimide and oxymethyl phthalimide to pregnant rats. Those findings, in conjunction with metabolic studies applied to fetuses isolated by caesarian section, appear to suggest the occurrence of an intensive metabolism in fetal tissue. Certain differences established between results of thin-layer chromatography, on the one hand, and ^{15}N studies, on the other, are likely to support the assumption that phthalimide is further metabolized by splitting the imide ring yielding phthalamic acid. (Author abstract by permission)

79-0103. Teichmann, B.; Hauschild, F. (Zentralinst. Krebsforsch., Akad. Wiss. DDR, Berlin-Buch, DDR) **Zur Pruefung von *O,O*-Dimethyl (1-hydroxy- 2,2,2-trichloraethyl)- phosphonat (Trichlorphon) auf kanzerogene Wirkung in Maeusen durch orale (oesophago-gastrale Sondung), intraperitoneale und dermale Applikation. [Examination of the carcinogenic activity of trichlorfon in mice by oral, intraperitoneal and dermal administration.]** *Arch. Geschwulstforsch.* 48(4): 301-307; 1978. (9 references) (German)

Trichlorfon was examined for carcinogenic activity in male and female descendants of AB/Jena mice. Animals were treated po (by esophageal catheter) for 73 wk, ip for 73 wk, or dermally (by painting a 1% acetone solution on the back twice a week) for 75 wk. The total doses were in the range of 155 mg by po and ip administration, and 375 mg for dermal administration; approximately 60 mice were treated by each administration method. Surviving animals were killed 80 wk after the beginning of the experiment. Bening and malignant tumors were observed in all groups, including controls. Tumors in test animals did not differ significantly from those in controls in number or localization.

79-0104. Serafin, B.; Majewski, M.; Faff, J.; Borkowska, G.; Bak, W.; Szamenska, T.; Walcyzna, K. (Inst. Org. Chem. & Technol., Technical Univ., Warsaw 00662, Poland) **Potential acetylcholinesterase reactivators. Synthesis and pharmacological investigations.** *Arch. Immunol. Ther. Exp.* 25(6): 839-849; 1978. (11 references)

The preparation of compounds that act as reactivators of acetylcholinesterase inhibited by DFP is described. The synthesized compounds were a series of oximes and amidoximes derived from pyridine and benzimidazole, which were tested *in vivo* and *in vitro*. Compounds purity was confirmed by TLC, and the compounds themselves were identified by methods reported in the literature or by elemental analysis and IR and NMR spectra. *In vivo* studies on the effectiveness of the compounds were carried out in mice exposed to DFP, an acetyl cholinesterase inhibitor. In addition, *in vitro* studies involving human erythrocytes treated with DFP were conducted. Both the *in vivo* and the *in vitro* examinations showed the new compounds to be relatively poor

acetyl cholinesterase reactivators. It is suggested that these findings are a result of the smaller affinity and reactivity of these compounds toward inactivated acetyl cholinesterase.

79-0105. Kleinrok, Z.; Jagiello-Wojtowicz, E.; Siekluck-a-Dziuba, M. (Dep. Pharmacol., Inst. Clin. Pathol., Med. Acad., Lublin 20090, Poland) **The influence of DFP, atropine, and toxogonine on tryptophan pyrolase activity in mouse liver.** *Arch. Immunol. Ther. Exp.* 25(6): 829-837; 1978. (25 references)

In vivo and *in vitro* studies were made on the effects of fluorostigmine (DEP), atropine, and toxogonin on tryptophan pyrolase activity in mouse liver. For the *in vivo* studies, mice were injected with one or more of the above compounds, and the activity of tryptophan pyrolase in mouse liver homogenates was determined spectrophotometrically at various time intervals after injection. The *in vitro* study tested the tryptophan pyrolase activity in mouse liver homogenates containing various cnocentrations of DFP. It was found that lower doses of DFP reduced the enzyme activity 2-3 hr after DFP administration. However, the higher doses of DFP increased the enzyme activity at 30 and 60 min after injection. Treatment with atropine also showed a two-phase effect on pyrolase activity--enzyme activity increased 1-2 hr after treatment, and decreased 3-4 hr after injection. Treatment with toxogonin did not affect enzyme activity until 3-4 hr after treatment, when an increase in enzyme activity was observed. Further studies have shown that, in general, simultaneous treatment with toxogonin and atropine eliminates or distinctly reduces the effects of DFP.

79-0106. Hettwer, H.; Gandawidjaja, L. (Anat. Inst., Univ. Duesseldorf, Duesseldorf, Germany) **Befunde an Phorphorsaeureester-vergifteten Ratten nach Antidottherapie. II. Aktivitaetsbestimmungen einiger Serumenzyme. [Results from phosphoric ester poisoned rats after antidote therapy. II. Assessment of some serum enzyme activities.]** *Arzneim. Forsch.* 28(II)(8): 1381-1388; 1978. (57 references) (German)

The effectiveness of toxogonin, toxogonin plus atropine, and toxogonin plus atropine plus Solcoseryl (Solco, Basel, low-molecular active agents from young calf blood from which proteins have been removed) as antidotes of paraoxon poisoning in rats was examined. One, eight or eighty doses of an LD50 (0.426 mg/kg) dose of paraoxon was administered sc to female Sprague-Dawley rats followed by administration of the antidote. The GOT, GPT, CPK, ChE, LDH, and SDH enzymatic activities were measured at 3,6,10,24 and 36-48 hr after intoxication. Neither toxogonin nor toxogonin plus atropine prevented increases in the above enzymatic activities, but the combination of both antidotes with Solcoseryl did. Thus cholinesterasic activity returned to normal after 36 hr due to the activation of the disturbed energy metabolism by Solcoseryl.

79-0107. Bogachuk, G. P.; Filenko, V. E. (Lab. Age Anthropol., Res. Inst. Physiol. Child. & Adolesc., Moscow, USSR) **Vliyanie obshchei vertikal'noi vibratsii i polikhlorkamfena na pochki inbrednykh krys. [Effect of general vertical vibration and polychlorocamphene on kidneys of inbred mice.]** *Arkh. Anat. Gistol. Embriol.* 75(7): 24-27; 1978. (7 references) (Russian)

The nephrotoxicity of combined exposure to general vertical vibration and organic pesticide polychlorocamphene (PCC) was studied in inbred August and Wistar rats. Rats of each line were divided into four groups: rats in group 1 served as intact control, rats in group 2 were exposed daily to general vertical vibration (50 Hertz, 30 min/day, for 60 day), rats in group 3 received PCC at 0.01 LD50, po, for 2 mo), and rats in group 4 were subjected to vibration and PCC at durations and doses as in groups 2 and 3. Animals in all test groups showed marked decrease in total body wt and in wt of both kidneys. The thickness of the cortical layer was reduced in Wistar rats from 3.10 mm (in controls) to 2.14 mm in group 2, 2.14 mm in group 3 and 2.24 mm in group 4, and in August rats from 2.68 mm (in controls) to 2.00 mm in group 2, 1.94 mm in group 3 and 1.97 mm in group 4.

79-0108. Townsend, M. G.; Kyprianou, P.; Smith, D. R. (Pest Infest. Control Lab., Minist. Agric. Fish. & Food, Surrey KT6 7NF, England) **The assay of prothrombin in the plasma of rodents and birds.** *Biochem. Soc. Trans.* 5(5): 1446-1448; 1978. (10 references)

The biochemical reagents in commercially available blood clotting test kits are often insensitive to small changes in coagulation activity, making them unsuitable for some studies, especially those involving birds. For this reason, new methods for the assay of blood-clotting factors were tested. Results from clotting studies carried out on quail and rats treated with warfarin were compared with those from methods where a synthetic derivative replaced fibrinogen as a substrate for thrombin. The method that proved most suitable involved adding rat or quail plasma to the synthetic substrate benzoyl-*L*- phenylalanine- *L*-arginine- *p*-nitroanalide. Thromboplastin was used to activate the prothrombin, and hydrolysis of the substrate was measured spectrophotometrically. For both animals, this proved to be a sensitive method that required only small amounts of plasma. In addition, there was a linear relationship between the plasma dilution and the rate of reaction, making this an acceptable assay for experimental use in avian and other small species.

79-0109. Thompson, W. D.; Patrick, R. S. (Univ. Dep. Pathol., Royal Infirmary, Glasgow G4 OSF, Scotland) **Collagen prolyl hydroxylase levels in experimental paraquat poisoning.** *Br. J. Exp. Pathol.* 59(3): 288-291; 1978. (14 references)

Pulmonary damage to the lung caused by paraquat was examined with reference to collagen prolyl hydroxylase levels as possible indicators of the extent of damage. Male Sprague-Dawley rats were given single doses of paraquat dichloride at 20 mg/kg by ip injection, then were sacrificed on days 1 through 7 following treatment. Body weight was seen to decline steadily, losing about 20% by day 5. Lung dry

weight by this time had increased by 80% and and wet weight by nearly 400%. Protein content of the lung supernatant increased by 600%. DNA content did not change. Collagen prolyl hydroxylase levels were significantly increased. Serum levels of the enzyme unexpectedly rose in a manner similar to the lung. A three and a half-fold increase was noted in the serum prolyl hydroxylase enzyme by the 5th day. Activity of this enzyme in the liver or kidney was not increased. On the first day after paraquat injection, the prolyl hydroxylase level fell 67% in the liver. Pulmonary fibrosis was noted in the lungs. The onset of the enzyme elevations in the serum and lungs correlated with the early histological appearance of cellular proliferation in lung alveoli.

79-0110. Seidenfeld, J. J.; Wycoff, D.; Zavala, D. C.; Richerson, H. B. (Univ. Hosp., Univ. Iowa, Iowa City, IA 52242) **Paraquat lung injury in rabbits.** *Br. J. Ind. Med.* 35(3): 245-257; 1978. (29 references)

The purpose of this investigation was to test the toxicity of paraquat, usually applied as an aerosol for agricultural use, on the lungs of rabbits. The studies were carried out on New Zealand White rabbits exposed to paraquat (PQ) in aerosol form. The following test groups were established: Group I received 10 g PQ/100 ml double distilled water (DDW) in just one 2 hr exposure; Group II was exposed to 200 mg PQ/100 ml DDW in 5 weekly 2 hr exposures; and Group III was treated with 10 mg PQ/100 ml DDW in 13 weekly 2 hr exposures. The control groups received 100 ml DDW only. In the course of the experiments, pulmonary function was assessed by measuring functional residual capacity, breathing frequency, arterial oxygen tension, arterial carbon dioxide tension, lung compliance and blood pH. In addition, lung tissue was examined with a scanning electron microscope, and tissue paraquat levels were determined by colorimetric assay. The results indicated that inhalation of paraquat induces dose-related damage to the lungs of rabbits. Group I animals all died within 38 hr, while Group III specimens did not differ significantly from the control. Tests on Group II animals showed that in most specimens the arterial oxygen tension and specific compliance decreased, while breathing frequency and functional residual capacity increased. Tissue studies gave evidence that PQ accumulates in the lung tissue after repeated inhalation.

79-0111. Rzeszowska, G.; Latalski, M. (Dep. Histol. & Embryol., Inst. Biol. Morphol., Acad. Med., Lublin, Poland) **Badania nablonnika jelita cienkiego szczurow bialych po doustnym podaniu mieszaniny chlorfenwinfosu i karbarylu. Cz. 1. Obserwacje histochemiczne. [Studies on epithelium of small intestine in rats intoxicated orally with a mixture of chlorfenvinphos and carbaryl. I. Histochemical observations.]** *Bromatol. Chem. Toksykol.* 10(4): 367-376; 1977. (17 references) (Polish)

Activities of adenosine triphosphatase (ATPase), alkaline phosphatase, glucose-6- phosphatase, and acid phosphatase were investigated in small intestinal epithelium of rats treated orally with a mixture of chlorfenvinphos and carbaryl. The pesticides were administered in a single dose or in repeated doses over a period of 12 wk. Some changes were observed in the ATPase and acid phosphatase reactions, but no effects were seen on alkaline phosphatase and glucose-6-phosphatase activities.

79-0112. Byczkowski, J. Z. (Dep. Pharmacol., Acad. Med., Gdansk, Poland) **Bioenergetyka termogenezy. Cz. III. Efekty dzialania wybranych srodkow hamujacych produkcje ciepla w organizmie ze szczegolnym uwzglednieniem hipertermii po DDT. [Bioenergetics of thermogenesis. III. Effects of some agents inhibiting heat production in the body with particular reference to DDT-induced hyperthermia.]** *Bromatol. Chem. Toksykol.* 10(4): 413-428; 1977. (61 references) (Polish)

Studies were conducted on mechanisms of heat production in the body and the mode of action of some hyperthermizing agents. Experimental hyperthermia was induced in rats with *p,p'*-DDT. The antihyperthermic effect of chlorpromazine and imipramine was investigated. Using decapitated rats as an *in situ* model it was found that the actions of chlorpromazine and imipramine are independent of the central thermoregulator. These drugs were found to alter the function of external and internal mitochondrial membranes. Chlorpromazine and imipramine thus increase the passive permeability of mitochondrial membranes. Chlorpromazine and imipramine thus increase the passive permeability of mitochondrial membranes with respect to potassium and sodium ions in a manner similar to that of classical antipyretics. They also inhibit β-oxidation of prostaglandins and State III respiration, as well as monoamine oxidase activity in rat liver mitochondria. An interaction between DDOH and chlorpromazine and/or imipramine with regard to mitochondrial permeability to potassium and sodium ions was found. The competition of these drugs with heat production in deenergization of mitochondrial membranes is discussed.

79-0113. Martin, D. H.; Lewis, R.; Tibbitts, F. D. (Dep. Biol., Univ. Nevada, Reno, NV 89557) **Teratogenicity of the fungicides captan and folpet in the chick embryo.** *Bull. Environ. Contam. Toxicol.* 20(2): 155-158; 1978. (5 references)

The synthesis of DNA, RNA and protein in developing chicks was studied after the eggs were treated with captan and folpet. Eggs were injected with 1, 6, 12, or 18 ppm captan just before incubation. A second study involved injection of the eggs with 12 ppm captan or folpet after 4 days incubation. The spectrum of teratogenic abnormalities observed both grossly and microscopically included: eventration of the viscera, microphthalmia, wing micromelia, leg hemimelia, deformed toes, asymmetrical development of the spine, lordosis of the spine, contortion of the neck, absence or reduction of upper beak, cross-beak associated with microphthalmia, and various degrees of failure of normal skull development. Spinal abnormalities were the most frequently observed abnormality with either chemical.

79-0114. McKague, A. B.; Pridmore, R. B. (British Columbia Res., Vancouver, BC V6S 2L2, Canada) **Toxicity of Altosid and Dimilin to juvenile rainbow trout and coho salmon.** *Bull. Environ. Contam. Toxicol.* 20(2): 167-169; 1978. (10 references)

The acute toxicities of Altosid (methoprene) and Dimilin (diflubenzuron) to juvenile rainbow trout were studied as well as to juvenile coho salmon. The effect of a 15 min exposure to both species of fish to 1 g/l Dimilin was determined. The fish were transferred to dechlorinated tap water after the 15 min of exposure, and kept there for 96 hr. Dimilan was not toxic to either species, up to 150 mg/l. A 15 min exposure to 1 g/l Dimilin did not cause any fish mortality. The 96 hr LC50 for Altosid for rainbow trout was 106 mg/l and for coho salmon was 86 mg/l. Compared to black-fly larvicides currently in use, the toxicity of these two test compounds is very low. It is suggested that the use of Altosid and Dimilin for future efforts at black fly control be considered.

79-0115. Steinwandter, H.; Schlueter, H. (Hessische Landwirtschaft. Versuchsanst., D-6100 Darmstadt, Germany) **Experiments on lindane metabolism in plants. IV. A kinetic investigation.** *Bull. Environ. Contam. Toxicol.* 20(2): 174-179; 1978. (9 references)

The kinetics of lindane metabolism under structured conditions are reported. A sample of grass contaminated with α-HCH (α-BHC) was processed in regular 3 wk intervals. Gas chromatography and mass spectrometry revealed no HCB (hexachlorobenzene) formation from α-HCH. This finding suggests that HCB and α-HCH are formed from lindane in a parallel reaction. In open field conditions, the formation of α-HCH occurred much faster than did that of HCB. However, HCB was formed much faster than α-HCH in a closed room condition. These findings reveal some of the difficulties encountered in the reproduction of ecological reaction conditions. The study does show that considerable quantities of HCB, α-HCH and β-HCH are formed from lindane in the environment.

79-0116. Pawar, S. S.; Kachole, M. S. (Biochem. Div., Chem. Dep., Marathwada Univ., Aurangabad 431002, India) **Hepatic and renal microsomal electron reactions in endrin treated female guinea pigs.** *Bull. Environ. Contam. Toxicol.* 20(2): 199-205; 1978. (26 references)

The effects of endrin on the levels of electron transport components, aminopyrine *N*-demethylation and lipid peroxidation were studied in adult female guinea pigs. Test animals were injected with endrin at 3 mg/kg in safola oil ip daily in the morning for 3 successive days. Animals were sacrificed 24 hr after the last injection. Endrin caused a significant increase in liver weight and decrease in hepatic microsomal protein content. An increase was noted in the hepatic cytochrome *b5* content and cytochrome *c* reductase activity. Cytochrome P450 and total heme were decreased significantly. Endrin decreased the rate of aminopyrine *N*-demethylation in the presence of TPNH, but increased the rate some in the presence of DPNH. The activity of renal aminopyrine *N*-demethylase was significantly lower than hepatic demethylase. Levels of lipid peroxides formed in the DPNH-induced system were higher than in the TPNH and ascorbate-promoted systems in untreated animals.

79-0117. Tu, C. M. (Res. Inst., Agric. Canada, London, Ont. N6A 5B7, Canada) **A screening technique for assessing effects of pesticides on population and activities of non-target soil microorganisms.** *Bull. Environ. Contam. Toxicol.* 20(2): 212-218; 1978. (7 references)

A simple screening procedure for the preliminary assessment of the effects of pesticides on soil microorganisms and microbial activities is presented. Changes which occur in microbial populations as determined by the dilution plate method, changes occurring in nitrification as determined by the soil perfusion technique, and changes in oxygen consumption as determined by using a differential respirometer are the only measurements needed for this procedure. The effects observed for dieldrin, chlorpyrifos and Vorlex (20% methyl isothiocyanate) were compared in three soil types with those produced by an antibiotic, a fungicide, and a nitrification inhibitor. The effectiveness of this simple technique was firmly established.

79-0118. Borsetti, A. P.; Roach, J. A. G. (Div. Chem. & Phys., US FDA, Washington, DC 20204) **Identification of Kepone alteration products in soil and mullet.** *Bull. Environ. Contam. Toxicol.* 20(2): 241-247; 1978. (11 references)

The findings of Kepone (chlordecone) homologs in soil and fish are reported as possible pathways for the environmental degradation of this pesticide. Soil was collected for analysis near the Kepone manufacturing site, Hopewell, Virginia. Thirty mullet were obtained from the James River, near Hopewell. Kepone residues were found in both soil and fish, at levels of 60 and 0.56 ppm, respectively. Gas-liquid chromatography was used to identify the other compounds in the samples as the 9-chloro and 8-chloro homologs of Kepone. Both of these homologs were present in the soil samples; only the 9-chloro homolog was detected in the mullet samples.

79-0119. Zaffaroni, N. P.; Arias, E.; Capodanno, G.; Zavanella, T. (Ist. Zool., Univ. Milano, Milan 20133, Italy) **The toxicity of manganese ethylene bis dithiocarbamate to the adult newt, *Triturus cristatus*.** *Bull. Environ. Contam. Toxicol.* 20(2): 261-267; 1978. (6 references)

Acute toxicity of maneb in the adult newt was studied. Percutaneous exposure was made at the 50 ppm level for 15 days, when fatality of all test animals occurred. When concentrations of 25 ppm were used, all males were dead within 25 days, whereas some females were still alive after 5 mo time. The most severly affected organs were the kidney and integument. It is suggested that an osmo-regulatory breakdown and an impairment of cutaneous respiratory exchanges are significant factors in the death of the animals. To a certain degree renal failure may have been a factor.

79-0120. Conklin, P. J.; Rao, K. R. (Fac. Biol., Univ. W. Florida, Pensacola, FL 32504) **Toxicity of sodium pentachlorophenate (Na-PCP) to the grass shrimp, *Palaemonetes pugio*, at different stages of the molt cycle.** *Bull. Environ. Contam. Toxicol.* 20(2): 275-279; 1978. (18 references)

The toxicity of sodium pentachlorophenate (PCP-NA) to the grass shrimp was evaluated at specific stages of the molt cycle using 96 hr bioassays. The LC50 values for the intermolt and early premolt shrimp were similar, with substantially lower LC50 values noted for late premolt animals at all exposure times. Mortalities of the last premolt stage exposed animals occurred shortly after molting. If animals survived the first 6 hr, they were generally able to survive the entire test period. At the most sensitive stage of the molt cycle the 96 hr LC50 value was 0.436 ppm. The relative changes in permeability of the cuticle during the molt cycle may be responsible for the observed increases in sensitivity of adult grass shrimp to PCP-Na soon after molting.

79-0121. Sirianni, S. R.; Huang, C. C. (Dep. Exp. Biol., Roswell Park Mem. Inst., Buffalo, NY 14263) **Effect of fungicide folpet on growth and chromosomes of human lymphoid cell lines.** *Can. J. Genet. Cytol.* 20(2): 193-197; 1978. (13 references)

Cytotoxic and cytogenetic effects of folpet were examined in cultured human lymphoid cells. Folpet inhibited growth of two human cell lines and caused an increase in chromosome damage. The normal human lymphoid cell line, *Jeff*, was more sensitive to the fungicide than the Burkitt cell line, *Raji*. At 0.5, 1, 2, 2.5, 4, and 5 μg/l as well as at 1 mg/l dissolved in dimethyl sulfoxide, folpet proved clastogenic in these cell lines. Due to the close correlation between clastogens and mutagens, it is inferred that the fungicide is mutagenic. Caution is advised in the use of folpet as a paint additive. Use of a different nonmutagenic, less toxic fungicide in place of folpet is recommended. Findings have shown that where folpet gives positive results in the Ames test, it also exhibits teratogenic effects in the chicken embryo and in golden hamsters. Folpet has been proven to have a structural relationship to known teratogens and mutagens.

79-0122. Stanley, P. I.; Bunyan, P. J.; Rees, W. D.; Swindon, D. M.; Westlake, G. E. (Pest Infest. Control Lab., Minist. Agric. Fish. & Food, Tolworth, Surrey, England) **Pesticide-induced changes in hepatic microsomal enzyme systems: further studies on the effects of 1,1- di(*p*- chlorophenyl)-2-chloroethylene (DDMU) in the Japanese quail.** *Chem. Biol. Interact.* 21(2-3): 203-213; 1978. (32 references)

A study was made of the relative strength of DDMU as an inducer of liver microsomal enzyme in Japanese quail, relative to *p,p'*-DDT, *o,p'*-DDT or other DDT derivatives. Groups of 64-wk-old quail were fed diets *ad lib* containing 100 ppm *p,p'*-DDT, 100 ppm *o,p'*-DDT, 100 ppm *p,p'*-DDE, 100 ppm *p,p'*-DDD (TDE) and 100 ppm DDMU for periods of 28 to 31 days. Substantial increases in relative liver weight and in hepatic glucose-6- phosphatase were noted after DDMU feeding at 100 ppm for 28 days. It was concluded that this increase in relative liver weight was biphasic. The initial phase lasted up to 16 days and was characterized by increase in weight and decrease in protein content, indicated by a dramatic triglyceride content increase. During this time the increase in liver weight is associated with an increase in cell size rather than cell proliferation. During the second phase, cell proliferation and protein synthesis both occur. DDMU caused major changes in the avian liver as well as a marked microsomal enzyme induction.

79-0123. Kohli, K. K.; Venkitasubramanian, T. A. (Dep. Biochem., Vallabhbhai Patel Chest Inst., Univ. Delhi, Delhi 110007, India) **Effect of dieldrin toxicity on pyridine nucleotides and activities of NADH and NADPH oxidase in rat liver.** *Chem. Biol. Interactions* 21(2-3): 337-341; 1978. (16 references)

The effect of dieldrin given as a single oral dose (30 mg/kg) was studied on the levels of hepatic pyridine nucleotides in the rat. No effects were noted on the body weight of the animals. Liver weights were significantly increased. A 30% increase was noted in the levels of NADH in dieldrin-treated rats. The ratio of NADH/NAD was increased by 45%, a highly significant increase. A small but significant decrease was noted in the level of NADPH. Specific activity of mitochondrial NADH oxidase was inhibited by 50%. A significant induction of microsomal NADPH oxidase activity was noted, 190% when presented at units/g fresh liver, 285% at units/liver 100 g body weight, and 170% at units/mg protein. The noted increase in the NADH/NAD ratio is important in dieldrin-induced gluconeogenesis. The decrease in NADPH/NADP ratio may be responsible, in part, for the decreased *de novo* synthesis of fatty acids in the liver after exposure to dieldrin.

79-0124. Schuphan, I.; Kossmann, U.; Ebing, W. (Inst. Pflanzenschutz mittelforsch., Biol. Bundesanst. Land. & Forstwirtsch., D-1000 Berlin 33, Germany) **Zum Metabolismus von Thiocarbamat-Herbiziden. II. Synthese von Triallat Metaboliten und Ermittlung ihrer phytotoxischen Eigenschaften. [Metabolism of thiocarbamate herbicides. II. Synthesis of triallate metabolites and studies of their phytotoxic properties.]** *Chemosphere* 6(12): 803-808; 1977. (5 references) (German)

The synthesis of some hypothetical chlorinated triallate metabolites (which may be formed in the soil and plants by hydrolysis) is described. Their phytotoxic properties were studied in analogy to other herbicides whose metabolites were found to possess phytotoxic properties. Triallate, *N,N*-diisopropyl- 2,3,3-trichloro allyl- thiocarbamate, is a selective soil disinfectant used to control *Avena fatua* and *Alopecurus myosuroides*. The phytotoxicities of 4 concentrations of the metabolites 2,3,3-trichloro- 2-propenol- (1); 2,3,3-trichloro-2-propenethiol- (1); 2,3,3-trichloro- 2-sodium propene sulfonate-(1) and of triallate werestudied over a 21 day period in germination tests on seeds of wheat, *Avena fatua* and *Alopecurus myosuroides*, in pots. None of the three hypothetical metabolites was found to possess herbicidal properties. It

is thought that the herbicidal property of triallate is based on the formation of oxidation products of intact thiocarbamate such as sulfoxides and sulfones.

79-0125. Lee, S. H. S.; Rozee, K. R.; Safe, S. K.; Crocker, J. F. S. (Dep. Microbiol., Dalhousie Univ., Halifax, Nova Scotia, Canada) **The properties of emulsifiers that enhance the replication of viruses in cell culture.** *Chemosphere* 7(7): 573-589; 1978. (10 references)

Some commercial emulsifiers, used with insecticides to aid in dispersal, are capable of enhancing the sensitivity of mammalian cells in culture to infection by viruses such as VSV, EMC, Vaccinia virus, Herpes 1, Reo 2, and Polio 1. Cultured cells of African gree monkey cells, mouse L-929, and HeLa cells were used to test the enhancing effects of the emulsifiers Toximul MP8, and Allox 3409, the insecticide fenitrothion and the solvent Aerotex 3470. After treatment with the emulsifiers, the viruses were allowed to adsorp into the cultures for 90 min. Allox 3409, Toximul MP8, and fenitrothion enhanced the growth of viruses, while Aerotex 3470 had no effect. Plaques of visicular stomatitis virus increased from 41 ± 1.5 (control) to 127 ±2 11.8 at 2.5 ppm fenitrothion, to 214 ± 8 at 10.0 ppm Toximul MP8, and to 184 ± 3.1 at 10.0 ppm Allox 3409. Single stranded RNA viruses were enhanced by the emulsifiers, while double stranded viruses gave no response. Some cell lines (HeLa) were more sensitive to the enhancement effects than others.

79-0126. Crocker, J.; Digout, S.; Bagnell, P.; Lee, S.; Rozee, K.; Safe, S. (Dep. Pediatr., Dalhousie Univ., Halifax, Nova Scotia, Canada) **Viral interaction with pesticide emulsifiers *in vivo*.** *Chemosphere* 7(7): 597-606; 1978. (10 references)

The susceptibility of mammals to the combined effects of virus infection and spray chemical intoxication was examined. Swiss white mice were exposed daily to doses of various combinations of fenitrothion, Toximul MP8, Allox 3409, and Aerotox 3470, and then were exposed to the mouse encephalomycarditis virus. Mice exposed to the chemicals and subsequently infected with the virus had higher mortality rates. Hormel Pigmee Pigs were treated with the same chemicals as well as DDT, and infected with Polioencephalomyelitis. The mortality rate was higher in the pigs exposed to the chemicals. The pesticide carriers were able to change a benign dose of virus to a lethal level. Because of the large amount of emulsifiers and dispersal agents used, the possible toxic effect on humans of these substances should be investigated.

79-0127. Mahon, D. C.; Oloffs, P. C.; Hardwick, D. F. (Dept. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada) **Interactions, in rats, between CCl_4-induced liver cirrhosis and chronic treatment with the organochlorine insecticide chlordane.** *Clin. Biochem.* 11(4): 135-138; 1978. (15 references)

A study was designed to compare the effects of chlordane exposure on healthy and disease rats. Five experimental groups were set up which included rat exposed to gaseous carbon tetrachloride to induce liver cirrhosis, rat exposed to chlordane only, a control group, rats exposed to carbon tetrachloride and chlordane, and rats exposed to carbon tetrachloride followed by chlordane. The livers were removed and examined histologically and chemically. Micropathological examination showed that all groups exposed to carbon tetrachloride exhibited symptoms of cirrhosis. However, after 20 wk, those animals exposed to both carbon tetrachloride and chlordane simultaneously exhibited symptoms of cirrhosis to a much lesser degree than rats exposed to carbon tetrachloride followed by chlordane or rats exposed to carbon tetrachloride alone. These findings suggest that chlordane acts in a protective manner against the induction of liver cirrhosis by carbon tetrachloride. The mechanisms of this protective action are being researched in current experiments.

79-0128. Rinkus, S.; Legator, M. (Med. Branch, Univ. Texas, Galveston, TX) **Deficiencies in the microbial activation system for mutagenic - carcinogenic screening.** *Clin. Genet.* 13(1): 133-134; 1978.

The use of microbial systems as the sole preliminary screen in a tier approach to testing for mutagenic and/or carcinogenic agents is inadvisable for a number of reasons, including the inability of the microbial tester strains, with or without microsomal activation, to detect all genetic lesions (e.g., nondisjunctional events). Researchers have not succeeded in devising a standard *in vitro* microsomal activation system. It has also been impossible to detect certain chemicals because of their physical properties; it is not possible to test antimicrobial agents; and it is impossible to detect metabolites activated by routes other than liver microsomes in such systems. Some classes of known carcinogens, including diene pesticides, azo dyes, spindle poisons, metal carcinogens, and gamma radiation, are not active in the *Salmonella* activation system, the most efficient microbial system. The list of carcinogens for which a high correlation (88% of 179 carcinogens) in this test is claimed can be seen, upon closer analysis, to represent a product of some selection. The failure of microbial systems to detect known active compounds as well as their questionable relevance to humans argue against the use of such systems as a predictive model for carcinogenic or mutagenic activity.

79-0129. Forlin, L.; Lidman, U. (Dep. Zoophysiol., Univ. Gothenburg, S-40033 Gothenburg, Sweden) **Effects of clophen A50, 4-, 2,5,2′,5′-tetra- and 2,4,5,2′, 4′,5′- hexachlorobiphenyl on the mixed-function oxidase system of rainbow trout (*Salmo gairdnerii* Rich) liver.** *Comp. Biochem. Physiol. C.* 60(2): 193-197; 1978. (29 references)

Studies were made of the effects of 4-chlorobiphenyl (CB), tetrachlorobiphenyl (TCB), and hexachlorobiphenyl (HCB) on the hepatic mixed-function oxidase system in the rainbow trout. A single ip dose of Clophen A 50 or HCB gave results on cytochrome P450 content and *O*-demethylation of *p*-nitroanisole similar to those found for mammals, but no effects on either NADPH-cytochrome *c* reductase activity

nor microsomal protein and phospholipid contents were noted. The inductive ability of different specific chlorobiphenyls and their metabolites in the liver mixed function oxidase system in mammals seems dependent on the content and arrangement of chlorine atoms of the biphenyl molecule. Thus CB was the least potent inducer, but the most readily metabolized compound. HCB was the most potent inducer, but was metabolized the least. Results of this study support the suggestion that the mixed function oxidase system of salmonids in many aspects resembles the aryl hydrocarbon hydroxylase system in mammals.

79-0130. Autissier-Navarro, C.; Meiniel, R. (Lab. Biol. Anim., ERA CNRS 408, F-63170 Aubiere, France.) **Action du dicrotophos sur le developpement *in vitro* du tibia de l'embryon de Poulet. [Effect of dicrotophos on chick embryo tibia development *in vitro*.]** *C. R. Soc. Biol.* 171(6): 1235-1239; 1977. (17 references) (French)

The effect of the organophosphorus compound dicrotophos on the growth of chick embryo tibias cultured in a standard medium and of the simultaneous addition of nicotinamide on the teratogenic activity of dicrotophos was studied. While the normal linear growth of tibias over a 4 day incubation period was reduced by the addition of 0.3 mg dicrotophos from 60.57 to 43.84%, the addition of 0.5 mg dicrotophos reduced linear growth from 50.15 to 28.47% over the same time period with a simultaneous proportional reduction of weight. The addition of nicotinamide neutralized the teratogenic effect especially with respect to linear growth, increasing the 14.70% growth rate in the presence of dicrotophos to 28.83%. The histological changes induced by dicrotophos are described. The question whether dicrotophos interferes with the formation, chemistry or utilization of NAD remains unresolved. The observed *in vitro* effects of dicrotophos cannot be attributed solely to the action of the compound on other constituents of the organism *in vivo*.

79-0131. Hamada, N.; Peterson, R. E. (Sch. Pharm., Univ. Wisconsin, Madison, WI 53706) **Effect of microsomal enzyme inducers on 2,3,7,8- tetrachloro dibenzo- *p*-dioxin- induced depression in the biliary excretion of ouabain in rats.** *Drug Metab. Dispos.* 6(4): 456-464; 1978. (31 references)

Male Holtzman rats were treated for 10 days with a single oral dose of TCDD at 10 or 25 μg/kg which resulted in a dose-related depression in plasma disappearance and biliary excretion of ouabain. Phenobarbital given at 50 mg/kg/day on the 6th through 9th day after TCDD administration caused ouabain excretion to remain depressed on day 10. Similar results were obtained by giving the rats 3-methyl cholanthrene at 20 mg/kg/day during the same time period. However, dosing with either prognenolone- 16α- carbonitrile at 75 mg/kg/day or spironolactone at 75 mg/kg/day reversed ouabain depression on day 10. Repeated dosing with these agents is necessary for the reversal to be obtained. Neither agent reversed or protected against reduced bile flow and loss of body weight in the TCDD treated animals. Also, they failed to increase survival time after TCDD exposure.

79-0132. Freimane, T. Kh.; Grundule, M. V.; Heidemanis, K. K. (Inst. Biol., Latv. SSR Acad. Sci., Riga, USSR) **Izmeneniya biosinteza lipidov iz a atsetata-I-C-14 v organizme karpa pod vozdeistviem DDT. [Studies of lipid biosynthesis with ^{14}C-1-acetate in carp treated with DDT.]** *Eksp. Vodn. Toksikol.* 6:255-263; 1976. (11 references) (Russian)

The effects of DDT on the incorporation of ^{14}C-acetate-1 into total lipids, individual lipid fractions, and total fatty acids in various carp tissues have been investigated. The process of incorporation of the labeled acetate-1 into total lipids of blood plasma, liver and brain was inhibited under the influence of DDT. Decreased incorporation of ^{14}C-acetate-1 into total fatty acids of brain appeared to be fundamental. Less labeled acetate-1 was incorporated into phospholipids of myocardium and brain as well as into nonesterified fatty acids and cholesterol esters of brain. However, increased incorporation of ^{14}C-acetate-1 was observed in free cholesterol and cholesterol esters of liver. The increased incorporation of ^{14}C-acetate into cholesterol esters and triglycerides of blood plasma was also observed.

79-0133. Mehendale, H. M. (Dep. Pharmacol. & Toxicol., Med. Cent., Univ. Mississippi, Jackson, MS 39216) **Chemical reactivity-absorption, retention, metabolism, and elimination of hexachloro cyclopenta diene.** *Environ. Health Perspect.* 21: 275-278; 1977. (7 references)

Hexachloro cyclopenta diene (mirex, HCPD) is effectively eliminated from the body by urinary excretion, although it appears that expiration may also be another major elimination process. Male Sprague-Dawley rats were given 5 μ*M*, 1 μCi per animal orally. Nine percent of the dose was excreted 1 hr after intake (which equaled the amount eliminated fecally after 7 days) suggesting enterohepatic circulation. A single dose of HCPD decays biexponentially from the blood, with a terminal phase half-life of 60 min. Kidney tissues, followed by liver tissue, showed the only appreciable concentration of HCPD. HCPD is predmoninantly associated with cytosol fraction of both kidney and liver tissue. Pre-exposure to HCPD did not alter blood decay curves or biliary excretion, but did increase kidney retention.

79-0134. Fabro, S. (Dep. Obstet. & Gynecol., George Washington Univ., Washington, DC 20037) **Penetration of chemicals into the oocyte, uterine fluid, and preimplantation blastocyst.** *Environ. Health Perspect.* 24: 25-29; 1978. (51 references)

Studies regarding the penetration of chemicals into the oocyte, uterine fluid, and preimplantation blastocyst are reviewed. Early studies have suggested that all the components of the ovarian follicles are readily permeable to endogenous as well as exogenous chemicals. Some reports have noted the passage of chemicals into the oviduct and the conceptus during the premorula stages of pregnancy. Significant amounts of unchanged chemicals, including DDT, were found in the uterine fluid of rabbits, rats, and mice after oral or parenteral administration. Foreign substances passed into

the secretion of several exocrine glands, and this transfer was seen to be dependent on the pH of the secretion. Pregnancy may modify the degree to which drugs pass into the uterine fluid, however, such has not been found to be the case with the passage of DDT. DDT has been found in the blastocysts of rabbits following maternal treatment. DDT treatment during the preimplantation stages of pregnancy did not decrease the number of implantations, but did result in significantly lower average volumes of the implanted embryos at 8 days of pregnancy. In rabbits, DDT exposure during the preimplantation stages of pregnancy exerted a toxic action which was manifested by intrauterine growth retardation. These findings and others suggest that exposure of the mother during the preimplantation stages of pregnancy to some commonly encountered environmental agent, such as DDT, may result in a type of toxicity manifestated by intrauterine growth retardation in the absence of teratogenesis.

79-0135. Jowett, P. E.; Rhead, M. M.*; Bayne, B. L. (Plymouth Polytech., Plymouth, Devanshire PL4 8AA, England) ***In vitro* changes in the activity of ATPases in the gills of *Carcinus maenas* exposed to various concentrations of *p,p'*-DDT.** *Environ. Pollut.* 17(1): 1-6; 1978. (21 references)

This paper describes the change in enzymatic activity in the gills of the shore crab (*Carcinus maenas*) after exposure to *p,p'*-DDT. After the crabs were killed, the gills were removed, homogenized, and differentially centrifuged. These enzyme preparations were then added to culture medium along with *p,p'*-DDT solutions of various concentrations. The enzymatic reaction was initiated by the addition of Na_2 ATP, and the solutions were incubated for 1 hr. At the end of the reaction period, the optical density of each sample was read, and the protein content estimated. The specific activity of the enzyme was recorded in terms of protein content. The enzymes studied were Na^+K^+-ATPase and Mg^{2+}-ATPase, along with total ATPase activity. Mg^{2+} ATPase was inhibited at all concentrations of *p,p'*-DDT used, but Na^+K^+-ATPase activity at all concentrations of *p,p'*-DDT used, but Na^+K^+-ATPase activity was stimulated at all concentrations. Total ATPase activity (the sum of the two previous enzyme systems) was inhibited at higher concentrations. The ATPase enzymes studied are considered to be involved in the maintenance of ionic balance. It is expected that inhibition or stimulation of these enzymes by DDT could cause an ionic imbalance, and this possibility is being investigated.

79-0136. Cooke, A. S. (Monks Wood Exp. Stn., Abbots Ripton, Huntingdon PE17 2LS, England) **Shell structure of immature Roman snails (*Helix pomatia*) after exposure to *p,p'*-DDT.** *Environ. Pollut.* 17(1): 31-37; 1978. (8 references)

A study was designed to determine the effect of *p,p'*-DDT on the thickness and structure of the shells of snails. Three treatment groups were established: control with access to calcium carbonate, control without access to calcium carbonate, and low dose DDT with calcium carbonate. The DDT exposure was achieved by feeding the snails lettuce leaves coated with DDT once each week until hibernation. Uncontaminated food was available at all other times. After hibernation the snails were killed. The shells were then measured and their ultrastructural detail was studied with an electron microscope. The shells of the snails exposed to DDT showed some structural distortion and were thinner than those of the control snails. The thickness of the shell was inversely proportional to the level of DDT found in the body of the snail. The shells of the calcium-deprived snails showed a similar effect, leading to the suggestion that DDT may impair calcium metabolism.

79-0137. Angsubhakorn, S.; Bhamarapravati, N.; Romruen, K.; Sahaphong, S.; Thamavit, W. (Dep. Pathobiol., Fac. Sci., Ramathibodi Hosp., Bangkok 4, Thailand) **Alpha benzene hexachloride inhibition of aflatoxin B_1-induced hepatocellular carcinoma. A preliminary report.** *Experientia* 34(8): 1069-1070; 1978. (7 references)

The possible prevention of liver carbinoma due to aflatoxin B_1 exposure by α-BHC was investigated. Male albino Fisher rats were treated with AFB_1 added to their diets. Some of the animals were also given α-BHC. α-BHC successfully protected against liver carcinoma development after aflatoxin B_1 ingestion. It is noted that this prevention of induction was similar to that found in animals exposed to ethionine and 3′-me-DAB. α-BHC induces microsomal enzymes and induces the proliferation of smooth endoplasmic reticulum as well as reducing the narcotic effect of hexabarbital. Therefore it is suggested that α-BHC induced the formation of liver hydroxylation enzymes which in turn metabolized AFB_1 to a non-carcinogenic product.

79-0138. Chadwick, R. W.; Copeland, M. F.; Chadwick, C. J. (Environ. Toxicol. Div., Health Effects Res. Lab., US EPA, Research Triangle Park, NC 27711) **Enhanced pesticide metabolism, a previously unreported effect of dietary fibre in mammals.** *Food Cosmet. Toxicol.* 16(3): 217-225; 1978. (45 references)

The effects of various dietary fibers on the metabolism of the organochlorine insecticide, lindane, were compared. Groups of six weanling female Sprague-Dawley rats were fed either a synthetic low-residue diet (LRD), LRD + 10% pectin, LRD + 10% cellulose, or Purina Lab Chow for 28 days. The animals were then dosed orally with 2.87 mg lindane (containing 1.66 μCi [U-^{14}C]lindane) and were killed 24 hr later. A smaller proportion of administered radioactivity was recovered in the excreta and selected tissues from the rats fed the LRD diet than from other groups and the fate of the radioactivity not accounted for was investigated in a second experiment using rats fed either LRD unsupplemented, LRD + 10% pectin or the standard chow diet. Pectin and the dietary fiber contained in Purina Chow caused significant alterations in the metabolism of lindane. A significant increase in the excretion of radiolabeled products, a higher level of conjugated chlorophenols and polar metabolites, a significant alteration in the proportions of the excreted chlorophenols and significant stimulation of the enzymes in-

volved in lindane metabolism indicated that dietary fiber such as pectin or the plant fiber in Purina Lab Chow can significantly affect the metabolism of xenobiotics in mammals. (Author abstract by permission)

79-0139. Das, K.; Singh, B. D.; Singh, R. B.; Singh, J.; Singh, R. M. (Dep. Genet. & Plant Breed., Fac. Agric., Banaras Hindu Univ., Varanasi 221005, India) **Cytological aberrations induced by Lasso, Machete and Stam F-34 in barley *Hordeum vulgare*.** *Indian J. Exp. Biol.* 16(4): 446-449; 1978. (12 references)

Seeds of barley cultivar 'Ratna' were treated with 250, 500, 1000, and 2000 μg/ml solutions of Lasso (alachlor), Stam F-34 (propanil), Machete (butachlor), and EMS (ethyl methane sulfonate). Mature plants (45-days-old) were sprayed once with the same herbicide solutions. Seed treatment reduced germination, plant height, and pollen fertility, with Stam F-34 having the greatest effect. Both mitotic and meiotic aberrations were observed in treated populations, with herbicide concentrations of 1000 μg/ml giving comparable frequencies of aberration to those induced by 1000 μg/ml EMS. Cytogenetic irregularities included bridge, fragment and laggard at mitotic anaphase, non-orientation, precocious separation and univalents at meiotic metaphase I, and lagging chromosome, bridge, and fragment at anaphase I. Herbicide sprayed plants showed a lower incidence of sterility and irregularities than the herbicide treated seeds.

79-0140. Zolotnikova, G. P.; Zotove, V. M.; Glushkova, N. A. (All-Union Sci. Res. Inst. Occupat. Safety Agric., Orel, USSR) **O toksichnosti ostatochnyhk doz pestitsidov v vozdushnoi srede teplits posle obrabotki rastenii. [Toxicity of pesticide residues in the air of greenhouse after pesticide application.]** *Gig. Sanit.* 43(6): 31-33; 1978. (5 references) (Russian)

The toxicity of pesticide residues in the air of greenhouses after fumigation was studied. Tests were conducted 2.5, 5, 10, 20, and 30 hr after phosphamidon and Acrex (dinobuton) were applied. Embryonic cell culture fibroblasts were used to determined the cytological effects of the pesticides. Pesticide residues in the air were measured by thin layer chromatography. The cytotoxic effects of both pesticides indicate sufficient reentry times should be established for phosphamidon and Acrex.

79-0141. Vasilos, A. F.; Anisimova, L. A.; Todorova, E. A.; Dmitrienko, V. D. (Moldavian Sci. Res. Inst. Hyg. & Epidemiol., Kishinev, USSR) **Reproduktivnaya funktsiya krys pri ostroi i khronicheskoi intoksikatsii tetra metil uramidulf'fidom. [The reproductive function of rats in acute and chronic intoxication with thiram.]** *Gig. Sanit.* 43(6): 37-40; 1978. (8 references) (Russian)

The effect of thiram on reproduction in animals was studied. Thiram in doses of 0.05, 0.1, 0.5, 1.0, 5.0 and 25 mg/kg was administered to white rats *in vivo* for 6 mo. Except for the 0.1 and 0.5 mg/kg groups, the animals were mated with the control group. In another experiment, the compound (25 mg/kg) was given to the animals throughout pregnancy. Another group received single doses of thiram (30 and 300 mg/kg) on days 4 and 15 of pregnancy. Some animals from each test group were sacrified on day 22 after mating. It was shown that both chronic and acute intoxication with thiram had no detrimental effects on reproductive activity. An increase in resorptions and embryos with subcutaneous hematomas and a decrease in body weights of embryos were observed only in cases where thiram was toxic to maternal animals.

79-0142. Ostrouhkova, V. A.; Onikienko, F. A.; Aleksandrova, L. G. (Kiev. Sci. Res. Occupat. Safety & Health, Kiev, USSR) **Zavisimost' mezhdu soderzhaniem pestitsida i biokhimicheskimi izmeneniyami v thanyahk i krovi pri intoksikatsii ronitom. [Relationship between pesticide content and biochemical changes in tissue and blood intoxicated with Ro-neet.]** *Gig. Sanit.* 43(6): 65-67; 1978. (7 references) (Russian)

The level of accumulation of Ro-Neet (*S*-ethyl *N* -ethyl -cyclohexil thiocarbamate, cycloate) in the animal tissue, the rate of its removal and the relationship between Ro-Neet content and subsequent biological changes were studied. A single dose of Ro-Neet (1000 mg/kg) was injected into the stomachs of white rats. The animals were sacrificed 1, 2, 4, 6 and 24 hr later and the pesticide content in blood and organs was measured. The activities of cytochrome oxidase (CO), succinic dehydroganese (SDH), alanine- and aspartate amino transferase (ALT and AST) and lactic dehydrogenase (LDH) in the liver and kidneys were also studied. It was found that Ro-Neet enters various organs immediately after its introduction into the stomach and is eliminated within 24 hr. There was no direct relationship between the level of the pesticide in the blood and tissue and the quality of changes. The biochemical indicators after maximum accumulation of Ro-Neet in the liver and kidneys were similar to those found in the control group.

79-0143. Becker, E. L.; Koza, E. P.; Sigman, M. (Dep. Pathol., Univ. Connecticut, Farmington, CT 06032) **Organophosphorus inhibition of lysosomal enzyme secretion from polymorphonuclear leucocytes. Evidence of a lack of a requirement for esterase activation.** *Immunology* 35(2): 373-380; 1978. (23 references)

Di-isopropyl methyl phosphate, a nonphosphorylating analogue of DFP, has been shown to inhibit the release of lysozyme and β-glucuronidase from rabbit polymorphonuclear leucocytes, induced by chemotactic factors in the presence of cytocholasin B. Enzyme release is inhibited by phenyl ethyl pentyl phosphonate and phenyl ethyl phenyl propyl phosphonate. Under the circumstances of this test, there was no evidence found to indicate that the release of lysosomal enzymes from rabbit peritoneal polymorpho nuclear leucocytes induced by chemotactic factors involves the activation of an esterase.

79-0144. Fawade, M. M.; Pawar, S. S.* (Div. Biochem., Dep. Chem., Marathwada Univ., Aurangabad 431004, India) **Alteration in mixed function oxidase system during thiodemeton (*o,o*-diethyl *S*-2(ethylthio) ethyl phosphorothioate) toxicity.** *Indian J. Exp. Biol.* 16(4): 481-484; 1978. (32 references)

The effect of thiodemeton (disulfoton) on hepatic drug metabolism and lipid peroxidation was studied using adult male mice. The animals were given thiodemeton po at 0.5, 1, 1.5, and 2 mg/kg in the morning for 2 successive days. Studies on the duration of dosing including animals which were given thiodemeton at 1 mg/kg for a 4 day period. The microsomal protein content showed an appreciable increase in the 0.5 mg/kg group and in the last dose of the 2 mg/kg group. Thiodemeton caused a significant decrease in the *N*-demethylase activity of aminopyrine and hydroxylase activity of acetanilide. The severity of the decrease was parallel with the increase in dose of thiodemeton. The 1.5 and 2 mg/kg doses registered significant decreases in hepatic microsomal electron transport components which were also noted during the 4 day duration study. NADPH-driven as well as ascorbate-promoted lipid peroxidation was significantly increased at all doses of thiodemeton. The duration study indicated an increase in NADPH linked and ascorbate promoted lipid peroxidation during the 4 days.

79-0145. Mukhopadhyay, P. K.; Dehadrai, P. V. (Cent. Inland Fish. Res. Inst., Barrackpore 743101, India) **Malathion toxicity and impairment of drug metabolism in liver and gills of the catfish *Clarias batrachus* (Linn).** *Indian J. Exp. Biol.* 16(6): 688-689; 1978. (24 references)

Air-breathing catfish were exposed to sublethal concentrations of malathion, 1 ppm, for 30 days. Such exposure enhanced activity of the drug metabolism system in liver and gills, manifested by an increase in *N*- and *O*-demethylase activity and an increased cytochrome P450 content. The stimulation of the *N*- and *O*-demethylase activity may be due to changes in the structure of malathion in the catfish system. The cytochrome P450 increase was associated with an increase in the metabolic activity of the monooxygenase system which metabolizes extraneous compounds. The significance of the presence of the mixed-function oxidase system in the gill is the fact that organs other than the liver may be important in the biotransformation of environmental xenobiotics in fish.

79-0146. Saxena, P. K.; Garg, M. (Dep. Zool., Fac. Basic Sci., Punjab Agric. Univ., Ludhiana, India) **Effect of insecticidal pollution on ovarian recrudescence in the fresh water teleost *Channa punctatus* (Bl).** *Indian J. Exp. Biol.* 16(6): 689-691; 1978. (17 references)

The extent to which carbaryl and fenitrothion affect oocyte maturation in *Channa punctatus* was investigated. The fish were exposed to LC50 concentrations of fenitrothion or carbaryl, 1.5 and 2 ppm, respectively, for 150 days. Both carbaryl and fenitrothion arrested ovarian recrudescence to different degrees. Carbaryl was more effective; it did not allow the appearance of stage III oocytes and precentages of stage I and atretic oocytes were higher. At day 120 of treatment, ovarian weights were lower than in controls in fish treated with carbaryl or fenitrothion. At day 150 of treatment, loss of stage II and stage III oocytes was noted in ovaries of carbaryl and fenitrothion treated fish, respectively.

79-0147. Hurkat, P. C. (Toxicol. Lab., Dep. Physiol. & Biochem., L. J. N. Med. Coll., Ajmer, India) **Some histological and histochemical studies in rabbits (*Oryctolagus cuniculus*) during sub-chronic administration of dieldrin (HEOD).** *Indian J. Exp. Biol.* 16(6): 716-718; 1978. (17 references)

The histological and histochemical effects of sub-chronic dosing with dieldrin was studied in rabbits. The rabbits were given dieldrin at 5 mg/ml ground-nut oil orally in a dose of 2.5 mg/kg body weight on alternate days and were sacrificed at intervals of 10 days up to 100 days. Dieldrin treatment caused an increase in liver size due to hypertrophy and hyperplasia of liver cells. Small white patches (the size of pinheads) were noted on livers of animals after day 60. With time, these gave the appearance of fatty liver. After 80 days the liver was hypotrophied and cells were necrosed. There was little initial change in the nuclei of liver cells. They were in time seen to have an increased number of binucleated cells along with enlargement in size and variation in nuclei diameter. After 60 days changes such as pyknosis, karyorrhexis, and karyolysis were noted. Glycogen content of liver cells was decreased considerably in dieldrin treated animals. Cholestrol content increased significantly. Lipid content of liver cells increased and increased activity of alkaline phosphatase was noted in the parenchyma cells. The decrease in liver glycogen appeared to be due to destruction of glucose-6-phosphatase located in the membranes of endoplasmic reticulum resulting from hepatotoxin administration.

79-0148. Dutta, S. K.; Mohanty-Hejmadi, P. (Dep. Zool., Utkal Univ. Bhubaneswar 751004, India) **Life history and pesticide susceptible embryonic stages of the Indian bull frog *Rana tigrina* Daudin.** *Indian J. Exp. Biol.* 16(6): 727-729; 1978. (7 references)

The effect of a common pesticide, Rogor (dimethoate), on the normal life cycle of the Indian bull frog, *Rana tigrina*, was investigated. Eggs, cleaving embryos and pre-limb stage tadpoles were exposed to ascending grades of 0.001 to 0.009% and from 0.001 to 0.009% Rogor. When eggs and cleaving embryos were treated with 0.001 to 0.009% Rogor, none reached metamorphosis. Rogor was significantly more toxic to pre-metamorphic larvae than to eggs with the LD50 value of 0.008 and 0.005% for eggs and pre-metamorphic larvae, respectively. Using lower concentrations resulted in smaller larvae and metamorphosed tadpoles, and a prolongation of the life cycle. Prolongation of larval life increases the exposure to both predation and desiccation pressures. Thus the survival of the larva is endangered. Smaller size at metamorphosis means less chance of survival in the future.

79-0149. Kan, C. A. (Spederholt Inst. Poult. Res., Minist. Agric. & Fish., Beekbergen, The Netherlands) **Accumulation of organochlorine pesticides in poultry: a review.** *J. Agric. Food Chem.* 26(5): 1051-1055; 1978. (52 references)

Accumulation ratios (level of pesticide in fat or egg to its level in the feed) of hexachlorobenzene (HCB), α-, β-, and γ-hexachloro cyclohexane (HCH), heptachlor and its epoxide, DDT, dieldrin, aldrin, endrin, and methoxychlor in laying hens and broilers are discussed. The pesticides can be grouped into several categories according to accumulation ratios: highly accumulating like HCH, β-HCH, heptachlor epoxide, dieldrin, aldrin; intermediate like heptachlor, endrin; low like α- and γ-HCH; and very low like methoxychlor. Depletion of residues of the pesticides in laying hens and eggs is correlated with the accumulative properties. Depletion of residues in broilers is mostly governed by growth rate and thus by dilution in the fat. (Author abstract reprinted by permission of the American Chemical Society)

79-0150. Feung, C. S.; Loerch, S. L.; Hamilton, R. H.; Mumma, R. O.* (Dep. Entomol., Pennsylvania State Univ., University Park, PA 16802) **Comparative metabolic fate of 2,4-dichloro phenoxyacetic acid in plants and plant tissue culture.** *J. Agric. Food Chem.* 26(5): 1064-1067; 1978. (24 references)

The metabolic fate of 2,4-dichloro phenoxyacetic acid (2,4-D) in soybean cotyledon callus tissue culture was compared with the metabolism in soybean and corn plants to determine the usefulness of plant tissue culture as a research tool for pesticide analysis. Both plants and callus tissue were able to metabolize 2,4-D by common metabolic pathways, by way of ring hydroxylation as well as conjugation of the carboxyl with amino acids and with sugars. Qualitatively the metabolites of 2,4-D were the same in callus tissue and in plants but they varied quantitatively. Soybean callus tissue formed amino acid conjugates and hydroxylated derivatives more extensively than soybean or corn plants. The plants contained a higher relative proportion of hydroxylated derivatives than amino acid conjugates. Therefore, 2,4-D metabolism in callus tissue is a good indication of the operating metabolic pathways. (Author abstract reprinted by permission of the American Chemical Society)

79-0151. Fuhremann, T. W.; Lichtenstein, E. P.*; Stratman, F. W. (Dep. Entomol., Univ. Wisconsin, Madison, WI 53706) **Effects of naturally occurring plant components on insecticide degradation in rats.** *J. Agric. Food Chem.* 26(5): 1068-1075; 1978. (19 references)

The effects of the naturally occurring, insecticidal, food plant components myristicin and *d*-carvone on insecticide degradation by subcellular fractions of rat livers or by intact liver cells (hepatocytes) were evaluated. The naturally occurring compounds were incorporated into rat diets to determine their in vivo effects on insecticide degradation by subcellular fractions or hepatocytes. To determine their in vitro effects, myristicin and *d*-carvone were added simultaneously with the insecticides to subcellular fractions or hepatocytes. Insecticides studied were [^{14}C]parathion, [^{14}C]paraxon, and [^{14}C]fonofos. Results indicated that both myristicin and *d*-carvone interacted with rat liver components to either increase insecticide degradation to detoxified metabolites or to block degradation as measured by an increased stability of the parent insecticide. Effects varied depending on the particular natural compound, the route of administration (in vivo or in vitro), and the particular liver cell fraction. The effects of feeding myristincin and *d*-carvone were in most cases different from effects observed after their simultaneous in vitro addition with the insecticides. Data indicated that the effects observed with these naturally occurring compounds in the living organism are not necessarily the same as those observed after their addition to subcellular liver fractions. Hepatocytes were found to be a useful alternative technique for investigating insecticide degradation. (Author abstract reprinted by permission of the American Chemical Society)

79-0152. Yang, R. S. H.; Pittman, K. A.; Rourke, D. R.; Stein, V. B. (Carnegie- Mellon Inst. Res., Carnegie- Mellon Univ., Pittsburgh, PA 15213) **Pharmacokinetics and metabolism of hexachlorobenzene in the rat and the rhesus monkey.** *J. Agric. Food Chem.* 26(5): 1076-1083; 1978. (29 references)

The metabolism of hexachlorobenzene (HCB) has been studied with respect to its tissue distribution, disposition, pharmacokinetics, and biotransformation in rats and rhesus monkeys. Preliminary results using the rat for a short-term (48 hr) study indicate that a very small portion ($< 2\%$) of the intravenously administered dose was excreted via various routes. Radioactivity was widely distributed in the tissues, with fat containing the highest level. Long-term studies were conducted in three rhesus monkeys for 100 days, 6 mo and 1 yr, respectively, following intravenous dosing of [^{14}C]HCB. At the end of 1 yr, cumulative fecal and urinary excretion accounted for 28.2 and 1.6% of the administered dose, respectively. HCB was widely distributed in the tissues. Among over 30 tissues analyzed, fat and bone marrow contained the highest level of radioactivity. A three-compartment, mammilary, open-system model was constructed to study the pharmacokinetics of HCB in the rhesus monkey. Based on computer-derived values using this model, theoretical curves representing the time-course behavior of plasma, fecal, and metabolized HCB in the rhesus monkey were found to match experimental data satisfactorily. Long-term storage of HCB in fat is the basic reason for the slow elimination rate of this compound from the animal. In the rat the amount of polar metabolites formed was estimated to be less than 0.2% of the administered dose. The very slow rate of metabolism of HCB was even more evident in the rhesus monkey. Thus, 1 yr after an intravenous injection, the cumulative fecal and urinary metabolites were estimated to be only 2.8 and 1.6% of the administered dose, respectively. A major fecal metabolite was identified as pentachlorphenol (PCP) by various chromatographic means. There was also traces of pentachlorobenzene (QCB) in the feces of the treated rhesus monkeys. All of the urinary radioactivity was in the form of polar metabolites of HCB; the indentities of these metabolites were unknown, although they were neither QCB nor PCP. (Au-

thor abstract reprinted by permission of the American Chemical Society)

79-0153. Hornish, R. E.; Nappier, J. L. (Upjohn Co., Kalamazoo, MI 49001) **Excretion and metabolism of 3,4,5-tribromo- *N,N,* α- trimethyl-1- *H*- pyrazole-1- acetamide in the rat.** *J. Agric. Food Chem.* 26(5): 1083-1086; 1978. (7 references)

The title compound, a potential preemergence herbicide, labeled in the C-3(5) position with ^{14}C, was administered orally to rats to determine the excretion pattern and the metabolism scheme. The herbicide was rapidly absorbed and metabolzied, and the metabolites were readily excreted; 90% of the dose was excreted within 72 hr. No significant residue levels were found in any tissue. The metabolism was characterized by two successive side chain *N*-demethylations, followed by hydrolysis to 3,4,5- tribromo- α-methyl- 1*H*-pyrazole- 1-acetic acid. This tribromo acid was the major metabolite, but was not the end product of metabolism. A reductive debromination of the tribromo acid occurred selectively at the C-5 position to produce the second most abundant metabolite. Debromination at either C-3 or C-4 was not detected. (Author abstract reprinted by permission of the American Chemical Society)

79-0154. DeBaun, J. R.; Bova, D. L.; Finley, K. A.; Menn, J. J.* (Biochem. Dep., Mountain View Res. Cent., Stauffer Chem. Co., Mountain View, CA 94042) **Metabolism of [*ring*-^{14}C] Ordram (molinate) in the rat. 1. Balance and tissue residue study.** *J. Agric. Food Chem.* 26(5): 1096-1098; 1978. (6 references)

Excretion of ^{14}C after administration of [*ring*-^{14}C] Ordram, molinate, to rats was rapid, with approximately 97% of an oral dose (72 mg/kg) being excreted within 48 hr after dosing. The major routes of excretion were via the urine (approximately 88%, urine + cage wash) and feces (approximately 11%). Less than 1% of the dose was detected in the sodium hydroxide air traps. No significant differences were observed between the rates and routes of excretion from male and female rats. Similarly, no significant differences in residual tissue ^{14}C attributable to sex effects were observed. With the exception of blood, residues associated with most tissues substantially decreased over the 7-day period after dosing. Whole-body residues decreased from an average of 13.8% of the administered ^{14}C at 1 day to 3.7% after 7 days. Seven-day blood residues were dose dependent, decreasing markedly from 40.1 ppm Ordram equivalents at a relatively high dose of 80 mg/kg to less than 1 ppm at a dose of 5 mg/kg. (Author abstract reprinted by permission of the American Chemical Society)

79-0155. DeBaun, J. R.; Bova, D. L.; Iseng, C. K.; Menn, J. J.* (Biochem. Dep., Mountain View Res. Cent., Stauffer Chem. Co., Mountain View, CA 94042) **Metabolism of [*ring*-^{14}C] Ordram (molinate) in the rat. 2. Urinary metabolite identification.** *J. Agric. Food Chem.* 26(5): 1098-1104; 1978. (10 references)

Ordam (*S*-ethyl hexahydro azepine-1- carbothioate, molinate) is readily degraded by the rat to more polar products which are excreted primarily in the urine. Unchanged Ordram accounts for only 0.1% of the urinary ^{14}C after an oral dose (72 mg/kg) of [*ring*-^{14}C] Ordram. The major metabolic pathway involves sulfoxidation and conjugation with glutathine, giving rise ultimately to a mercapturic acid derivative which accounts for 35.4% of the urinary ^{14}C. Ring hydroxylation to give the 3- and 4-hydroxy- Ordam derivatives (0.8% free, 26.1% as *O*-glucuronides) represents another major metabolic route. Hydroxylation in the 2 position of the ring and subsequent ring cleavage represent a minor pathway. Hexamethylene imine (14.6%) and 3- and 4-hydroxy hexamethylene imine (10.3%) are major metabolites presumably formed by hydrolysis of sulfoxidized Ordram and its hydroxy derivatives. Although there are small quantitative differences, the metabolism of [*ring*-^{14}C] Ordram in female and male rats is qualititatively the same. (Author abstract reprinted by permission of the American Chemical Society)

79-0156. Arjmand, M.; Hamilton, R. H.; Mumma, R. O.* (Dep. Biol., Pennsylvania State Univ., University Park, PA 16802) **Metabolism of 2,4,5-Trichloro phenoxyacetic acid. Evidence for amino conjugates in soybean callus tissue.** *J. Agric. Food Chem.* 26(5): 1125-1128; 1978. (15 references)

2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) is metabolized by soybean cotyledon callus tissue to ether- and water-soluble metabolites after 6 and 15 days incubation. The ether fraction consisted of *ca* 93% of the extractable ^{14}C label and was separated into seven bands on thin-layer chromatography. Only the major band was present (84.8 to 89.2%) besides unmetabolized 2,4,5-T, which was identified as a mixture of the glutamic acid (major) and aspartic acid (minor) conjugates of 2,4,5-T. The high recovery of radioactivity (99.1 to 91.9%) precludes appreciable decarboxylation in this tissue. (Author abstract reprinted by permission of the American Chemical Society.)

79-0157. Bigley, W. S.; Plapp, F. W., Jr.* (Dep. Entomol., Texas A&M Univ., College Station, TX 77843) **Metabolism of *cis*- and *trans*- [^{14}C]permethrin by the tobacco budworm and the bollworm.** *J. Agric. Food Chem.* 26(5): 1128-1134; 1978. (20 references)

The fate of ^{14}C-acid- and alcohol-labeled *cis* and *trans* isomers of permethrin (3-phenoxybenzyl 3-(2,2-dichlorvinyl)- 2,2-dimethylcyclo propanecarboxylate) was studied after topical treatment of larvae of the tobacco budworm, *Heliothis virescens* (F.), and the bollworm, *Heliothis zea* (Boddie). All permethrin preparations were very stable in *Heliothis* larvae under *in vivo* conditions, but older larvae detoxified the insecticide more rapidly than younger larvae. Permethrin metabolism was both hydrolytic and oxidative and the *trans* isomer was metabolized more rapidly than the *cis* isomer. Metabolism was more rapid in the tobacco budworm than in the bollworm, a factor probably responsible for the twofold greater tolerance of the former to permethrin. (Author abstract reprinted by permission of the American Chemical Society)

79-0158. Murthy, N. B. K.; Kaufman, D. D.* (Pestic. Degrad. Lab., Beltsville ARS, USDA, Beltsville, MD 20705) **Degradation of pentachloro nitrobenzene (PCNB) in anaerobic soils.** *J. Agric. Food Chem.* 26(5): 1151-1156; 1978. (24 references)

Anaerobic degradation of ^{14}C-labeled pentachloro nitrobenzene (PCNB, quintozene) was examined in flooded and moist Hagerstown silty clay loam, with and without cellulose amendments. All treatments were aerated with nitrogen in a continuous flow-through system which permitted trapping of CO_2 and volatilized products. PCNB enhanced soil respiration in all treatments. Total CO_2 production was greater in moist than in flooded soils. Essentially no $^{14}CO_2$ was evolved from any treatments. PCNB volatilized from all treatments, but volatilization was reduced by cellulose amendments. Although extractable radioactivity was the same (70%) from all treatments at the conclusion of the 40-day incubation period, differences were observed in the relative distribution of PCNB and its degradation products. Product identification was by thin-layer and gas-liquid chromatographic comparison with authentic standards. Pentachloroaniline (PCA) was the principal degradation products. Pentachlorothioanisole (PCTA) was more abundant in moist (5.8-8.2%) than in flooded soil (0.3-0.5%). Pentachlorophenol was also detected as a degradation product. Further degradation of PCA and PCTA were examined in similar anaerobic soils. PCTA did not significantly alter soil respiration, whereas PCA provided slight inhibition in cellulose amended soil. (Author abstract reprinted by permission of the American Chemical Society)

79-0159. Helling, C. S.; Krivonak, A. E. (Agric. Environ. Qual. Inst., ARS, USDA, Beltsville, MD 20705) **Biological characteristics of bound dinitroaniline herbicides in soils.** *J. Agric. Food Chem.* 26(5): 1164-1172; 1978. (21 references)

Bound [*phenyl*- ^{14}C]butralin residue, recovered after anaerobic incubation, was persistent in aerobic soil. Some ^{14}C from butralin residues bound to humic acids was lost (= 20%) during a 21-wk incubation, but the whole soil and other fractions were less degradable. Although no plant uptake of this ^{14}C was detectable, uptake did occur from partially bound and bound residues of six dinitroanilines previously incubated aerobically: butralin, chlornidine, dinitroamine, fluchloralin, profluralin, and trifluralin. Residues in soybean tops, after 10 wk growth, decreased from 0.7-2.3 ppm (partially bound) to 0.2-0.4 ppm (bound). Soybean top residues of approximately 1.4-1.8 ppm (dinitramine) to 0.5-0.8 ppm (trifluralin) were measured in soil treated with 0.29 ppm parent herbicide, but not preextracted; levels were slightly less from extracted soil. Extraction of soil with benzene- methanol (to remove nonbound residues) led to Mn toxicity in soybeans. Phytotoxicity was characterized by crinkled and spotted leaflets, branching from the cotyledon node, columnar plant shape, increased number of trifoliate leaves, reduced plant weight, and chlorosis. Mn in tops increased from 350 to 500 ppm because of extraction; leaf levels ≤ 1660 ppm Mn were found. Extractable Mn in soil increased because of previous benzene- methanol extraction (two- threefold), prolonged dry storage (threefold), or autoclaving (sixfold). Preextraction with benzene- methanol may have increased plant sensitivity to some bound residues and parent herbicides. Investigation of the bioavailability of bound residues to plants may be hampered by phytotoxicity caused by organic solvent removal of nonbound pesticide residues. (Author abstract reprinted by permission of the American Chemical Society)

79-0160. Schultz, D. P.; Harman, P. D. (Southeast. Fish Control Lab., US Fish. & Wildl. Serv., Warm Springs, GA 31830) **Uptake, distribution, and elimination of lampricide 2′,5-dichloro- 4′-nitro[^{14}C] salicylanilide (Bayer 2353) and its 2-aminoethanol salt (Bayer 73) by largemouth bass.** *J. Agric. Food Chem.* 26(5): 1226-1230; 1978. (6 references)

In two groups of largemouth bass exposed to a 0.05 μg/ml mixture of the lampricide 2′,5-dichloro- 4′-nitro [^{14}C] salicylanilide (Bayer 2353) and its 2-aminoethanol salt (Bayer 73, clonitralide) for 24 or 144 hr, radioactivity was found in all tissues and organs analyzed; the concentration was highest in the gallbladder and lowest in the muscle. The actual amount of ^{14}C material in the various tissues, when calculated as a percentage of the total in each fish, did not change significantly from one sampling interval to the next except for the bile and liver. Concentrations of ^{14}C material in tissues and organs were dependent on the loading rate of the fish (weight per unit volume of water) in the exposure solution. In a third group of fish, exposed to a 0.05 μg/ml mixture of the lampricide for 24 hr and then transferred to lampricide-free flowing water for as long as 14 days, the concentration of ^{14}C material decreased with time in all organs and tissues except in the gallbladder bile. There was little biomagnification of lampricide in the edible portion of the fish. (Author abstract reprinted by permission of the American Chemical Society.)

79-0161. Walker, N. (Rothamsted Exp. Stn., Herpenden, Hertfordshire AL5 2JQ, England) **A soil *Flavobacterium* sp. that degrades sulphanilamide and asulam.** *J. Appl. Bacteriol.* 45(1): 125-129; 1978. (11 references)

The isolation of a soil bacterium which is able to grow on either asulam or sulfanilamide as carbon and energy source is described. An initial concentration of 50 ppm sulfanilamide in 115 ml medium was incubated at 25°C. After 9 days no sulfanilamide was detected. Similar experiments with asulam were noted. After 61 days, a gram-negative, non-motile, non-spore forming rod was isolated from small, yellow colonies on sulphanilamide yeast-extract agar. Although there is some difficulty in classifying yellow pigmented rods of this type, the organism has been assigned to the *Flavobacterium*. The species could not be identified as any of those listed by Bergy for *Flavobacteria*.

79-0162. Fisher, P. R.; Appleton, J.; Pemberton, J. M. (Dep. Microbiol., Queensland Univ., Queensland, 4067, Australia) **Isolation and characterization of the pesticide-degrading plasmid pJP1 from *Alcaligenes paradoxus*.** *J. Bacteriol.* 135(3): 798-804; 1978. (39 references)

A major role in the environmental fate and behavior

of pesticides is that played by microbial degradation. A bacterial species, *Alcaligenes paradoxus*, although incapable of degrading phenoxyacetic acid, will rapidly degrade two synthetic pesticide derivatives, 2,4-D and 2-methyl-4- chlorophenoxyacetic acid. The first step in the degradation process is the conversion to the corresponding phenol, indicating that the degradation process is controlled by a first-step enzyme. The degradation ability is encoded in a 58-megadalton conjugal plasmid, pJP1. Further clarification of the microbial genes controlling pesticide degradation may modify the approach to manufacture and use of synthetic pesticides.

79-0163. Balba, H. M.; Saha, J. G. (Uniroyal Chem., Naugatuck, CT 06770) **Studies on the distribution, excretion, and metabolism of α- and γ-isomers of [^{14}C] chlordane in rabbits.** *J. Environ. Sci. Health B* 13(3): 211-233; 1978. (8 references)

The distribution of ^{14}C labeled α- and γ-isomers of chlordane was investigated in the excreta and tissues of rabbits and identification was made of the metabolites in the rabbit urine. About 1700 mg of each isomer were fed to four male rabbits in four doses. The rabbits excreted 77% of the α-isomer and 82% of the γ-isomer in the feces and urine. In the tissues the levels of concentration of the α-isomer were lighest in the fat and successively less in the kidney, muscle, liver, and brain samples. For the γ-isomer the order of decreasing concentration was kidney, fat, liver, muscle, and brain. Oxychlordane concentrations in the tisssues were higher than those of the parent compound. Oxychlordane was at maximum concentrations in the fat. Metabolites identified in the urine from rabbits fed the α-isomer were 1-hydroxy-2-chloroclordene, *trans*-chlordene chlorohydrin, and 1-hydroxychlordene. Of the rabbits fed the γ-isomer, urine contained the following isomers: 1-hydroxy-2- chlorochlordene, 1,2-dichloro chlordene, *trans*-chlordene chlorohydrin, and 3-hydroxychlordane.

79-0164. Hogue, E. J. (Res. Stn., Agric. Canada, Summerland, B. C. VOH 1ZO, Canada) **Absorption and translocation of metobromuron and chlorbromuron.** *J. Environ. Sci. Health B* 13(3): 323-339; 1978. (14 references)

Differences in the absorption, translocation, and metabolism of chemically similar *s*-urea herbicides such as metobromuron and chlorobromuron were investigated in coriander, tomato, and carrot. In tomato, a crop which is susceptible to both chemicals, root-fed metbromuron and chlorobromuron were readily absorbed and translocated to the foliage. Carrots and coriander, which are both moderately susceptible to metobromuron, absorbed and translocated metobromuron to the foliage. Chlorbromuron, to which these two plants, carrots and coriander are resistant, was found in the roots of these plants in high concentrations but was not translocated upward appreciably. When the two chemicals were applied to the leaves of tomato and coriander, no downward translocation was noted. As for metabolism of the compounds, neither was appreciably metabolized by coriander. The tomato showed significant amounts of 4-bromophenylurea and 3-chloro- 4-bromophenylurea being formed. The tolerance of carrot and coriander to metobromuron may be explained on the basis of either differential uptake or metabolism. Tolerance of chlorbromuron appeared mainly due to failure of the chemical to be translocated to the leaves.

79-0165. Buznikov, G. A.; Manukhin, B. N.; Rakich, L.; Kudryashova, N. I.; Khromov-Borisov, N. V. (Kh. S. Koshtoyants Lab. Physiol., Inst. Dev. Biol., USSR Acad. Sci., Moscow, USSR) **Influence of monoamines, thermal shock, and other factors on the binding of certain neuropharmacological preparations by sea urchin embryos.** *J. Evol. Biochem. Physiol. (USSR)* 13(2): 148-151; 1977. (8 references)

English translation; for an abstract of the original Russian article, see *Pesticides Abstracts* no. 78-2878.

79-0166. Jolly, A. L.; Graves, J. B.; Avault, J. W.; Koonce, K. L. (Sch. Forestr. & Wildl. Manage., Louisiana State Univ. Baton Rouge, LA) **Effects of a new insecticide on aquatic animals.** *La. Agric.* 21(2): 2-3; 1978.

The toxicity of Pounce, a synthetic pyrethroid, to crawfish, mosquitofish, channel catfish, largemouth bass, and bullfrog tadpoles was studied. Of the five animals studied, crawfish were the most susceptible. Concentrations of 0.39 and 0.62 ppb of Pounce were sufficient to cause 50% mortality in 8-12 and 20-30 mm crawfish, respectively, in 96 hr. Of the fish, catfish were most sensitive to Pounce. Fingerling bass and mosquitofish were more tolerant with 8.5 and 15.0 ppb, respectively, being required to kill 50% of these fish. Bullfrog tadpoles exhibited the greatest tolerance to Pounce of the five species bioassayed; 7,033 ppb caused a 50% mortality after 96 hr. Pounce exhibits a high degree of toxicity in the same range as most toxic organochlorines, such as endrin, DDT, and toxaphene.

79-0167. Bluethgen, A.; Heeschen, W.; Tolle, A.; Hamann, J. (Inst. Hyg., Bundesanst. Milchforsch., Kiel, Germany) **Tierexperimentelle Untersuchungen zum Uebergang von HCH-isomeren nach Hautapplikation in die Milch laktierender Kuhe. [Experimental studies on the carryover of BHC isomers in milk after topical application to lactating cows.]** *Milchwissenschaft* 32(3): 127-131; 1977. (1 reference) (German)

Organochlorine insecticides have been applied to dairy cows for ectoparasite control during the winter months. The implications of this practice were examined. Lindane levels in milk were determined following application of three powder formulations of BHC as a dust on the back and following 'washing' of the back with two liquid preparations. Results varied slightly depending on the specific preparation used, but to a rough approximation, application of 40-50 mg of lindane resulted in contamination of milk in excess of the lindane tolerance of 0.2 ppm (fat basis). Maximum lindane levels in the milk occurred at *ca.* 60 hr after application, but excretion continued at considerable levels for several weeks. Excretion of the α- and β-isomers of BHC in the milk persist-

ed far longer than that of lindane and therefore it is recommended that technical BHC not be used for ectoparasite control. Lanolin used in udder care preparations represents another potential source of BHC contamination. It has been recommended that the level of chlorinated hydrocarbons in milking aids should not exceed the tolerance levels in milk and dairy products.

79-0168. Fry, S. M.; Ficsor, G.* (Dep. Biomed. Sci., W. Michigan Univ., Kalamazoo, MI 49008) **Cytogenetic test of captan in mouse bone marrow.** *Mutat. Res.* 58(1): 111-114; 1978. (8 references)

Bone-marrow cytogenetic tests conducted using captan in mice are presented. The clastogenic alkylating agent, TEM, was used as a positive control. Within 12 hr of captan injection, toxicity was noted, including signs of edema, decreased body temperature, sluggishness and bluish color of the skin. At 6, 12, 30, and 54 hr following captan injection, lethality increased over controls by 0, 25, 20 and 68%, respectively.

79-0169. Carcinogenesis Prog., NCI, Bethesda, MD **Bioassay of dieldrin for possible carcinogenicity. CAS No. 60-57-1.** *Natl. Tech. Inform. Serv.* PB-275,676; 52 p.; 1978. (16 references)

A bioassay of purified technical-grade dieldrin for possible carcinogenicity was conducted by administering the test chemical in feed to Fischer 344 rats. Groups of 24 rats of each sex were administered dieldrin at one of three doses, either 2, 10, or 50 ppm, for 104-105 weeks. Matched controls consisted of groups of 24 untreated rats of each sex. Body weights of the rats were essentially unaffected by the treatment, but typical signs of organochlorine intoxication including hyperexcitability, tremors, and coma were observed in high-dose males beginning in week 76 and in high-dose females beginning in week 80. Survival was not adversely affected, and adequate numbers of rats were available for meaningful statistical analyses of the incidence of tumors. A variety of neoplasms were randomly distributed throughout the control and treated rats; however, the incidence was not statistically related to treatment. It is concluded that under the conditions of this bioassay, dieldrin was not carcinogenic in Fischer 344 rats. (Author abstract by permission)

79-0170. Vos, J. G.; van Logten, M. J.; Kreeftenberg, J. G.; Kruizinga, W. (Natl. Inst. Public Health, Bilthoven, The Netherlands) **Hexachlorobenzene-induced stimulation of the humoral response in the rat.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

In order to study the humoral immune response in the rat, rats were given food containing 0, 500, 1000, and 2000 mg hexachlorobenzene (HCB)/kg for three weeks. The results showed a slight increase in the number of lymphocytes in the peripheral blood, but a marked increase in the number of neutrophils, basophils and monocytes. The 1000 mg/kg level of HCB was chosen for further studies, and these studies indicated that HCB stimulates the humoral immune response in the rat. *In vitro* studies showed that HCB enhances the responsiveness of the peripheral lymphocytes and spleen, while *in vivo* tests indicated that it does not alter the cell-medicated immunity. The results presented in this paper contrast with other literature data which report that in mice HCB suppresses humoral and cell-mediated immunity.

79-0171. Moore, J. A. (Natl. Inst. Environ. Health Sci., Research Triangle Park, NC) **Comparative toxicity of halogenated dibenzofurans.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

The toxicity of three isomers of dibenzofuran (2,3,7,8-tetrachloro; 2,3,7,8-tetrabromo; and 2,3,4,7,8-pentachloro dibenzofuran) to mice, guinea pigs and rhesus monkeys was examined. The toxicity to the guinea pig was similar to that of the analogous halogenated dibenzodioxin. The toxicity of 2,3,7,8-tetrachloro dibenzofuran (LD50 = 1 mg/kg) was about 20 fold greater than that of the analogous dibenzodioxin; however, it produced no mortality in mice whether it was given as a single dose of up to 6 mg/kg or divided into 30 daily doses. In guinea pigs and rhesus monkeys there was progressive body weight loss before death. Thymic involution, minimal liver toxicity, hyperplasia of urinary tract epithelium, squamous metaplasia of meibomian glands, and hair loss were the major lesions observed in monkeys.

79-0172. Matthews, H. B.; Kato, S. (Natl. Inst. Environ. Health Sci., Research Triangle Park, NC) **The metabolism and disposition of halogenated aromatics.** *N. Y. Acad. Sci. Science Week* June 21-30:; 1978.

The polarity of the parent molecule and the rate of enzymatic degradation of the parent molecule to polar metabolites were seen to determine both the degree and site of halogenated aromatic hydrocarbon accumulation in tissues of higher animals. Phenols and phenoxyacetic acids are polar enough to be excreted before degradation. Kepone (chlordecone) and the dioxins, however, being less polar, are concentrated in the liver and excreted more slowly. Halogenated biphenyls and certain insecticides, the least polar molecules, accumulate in adipose tissue and skin and are not excreted prior to degradation. The degree and position of halogenation markedly affects rates of metabolism. Rates of metabolism also varied among species of compounds.

79-0173. McConnell, E. E. (Natl. Inst. Environ. Health Sci., Research Triangle Park, NC) **Toxicopathology characteristics of the halogenated aromatics.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

A similarity in lesions was seen within individual species of animals treated with lethal doses of the four structurally analogous aromatic hydrocarbons; dibenzodioxins, dibenzofurans, biphenyls, and napthalenes. However, differences occurred among different species tested. Acute and chronic exposures elicited two different sets of clinico pathological syndromes. In mice and rats, liver lesions were conspicuous,

but they were minimal for guinea pigs and non-human primates. The latter two species exhibited lesions of the urinary tract while none were observed in the other groups. The only lesion to consistently occur in all species was thymic involution, which occurred with both acute and chronic exposures. All compounds were carcinogenic.

79-0174. Rappe, C.; Buser, H. R.; Bosshardt, H. P. (Univ. Umea, Umea, Sweden) **Dioxins, dibenzofurans and other polyhalogenated aromatics - production, use, formation and destruction.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

Production, use, formation, and destruction of several compounds were reviewed in this paper. Polyhalogenated benzenes, toluenes, biphenyls (PCB), terpheryls (PCT), phenoxy acids and diphenyl ethers are polyhalogenated aromatics utilized in industry. During the 1970's the use of polybrominated aromatics as flame retardants increased. Polyhaloganated dioxins (PCDD) and dibenzofurans (PCDF) occur as impurities in chlorophenols, phenoxy acids and PCB, and have been identified in fly ash; however, they have no technical use. The burning of wood shavings treated with a commercial chlorophenate produces large quantities of PCDD and PCDF (> 1 mg/g). High yields (25%) of PCDF, including the highly toxic isomer 2,3,7,8-tetra-CDF, are produced by the incomplete burning of PCB's. The main methods of decomposition are complete incineration and photochemical degradation.

79-0175. Kociba, R. J.; Keyes, D. G.; Beyer, J. E.; Carreon, R. M.; Gehring, P. J. (Dow CHemical, Midland, MI) **Long-term toxicologic studies of 2,3,7,8-tetrachloro dibenzo-*p*-dioxin (TCDD) in laboratory animals.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

In a study on the effects of 2,3,7,8-tetrachloro dibenzo- *p*-dioxin (TCDD) on rats, 0.1, 0.01, and 0.001 μg/kg/day were fed for two years. The 0.1 μg/kg/day dose caused increased mortality, decreased weight gain, increased porphyrin excretion and altered organ morphology (especially in liver). Increased numbers of carcinomas of the liver and lungs, hard palate/ nasal turbinates or tongue were seen; however, a decreased rate of carcinomas was seen in the pituitary, uterus, mammary glands, pancreas and adrenals. The 0.01 μg/kg/day dose had a lesser degree of toxicity. The 0.001 μ g/kg/day dose caused no adverse effect.

79-0176. Holmes, P. A.; Rust, J. H.; Richter, W. R.; Shefner, A. M. (IIT Res. Inst., Chicago, IL) **Long-term effects of TCDD and HCDD in mice and rats.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

Studies were performed on the toxicity of tetrachloro dibenzo- *p*- dioxin (TCDD) and a mixture of isomers of hexachloro dibenzo- *p*-dioxin (HCDD) on rats and mice using gavage and skin painting methods over a two year period. HCDD slightly increased hepatic tumors in female rats and greatly increased neoplastic nodules. Multifocal pulmonary adenomatosis increased in both sexes of treated rats. Hepatic tumors increased in HCDD and TCDD gavage treated male mice. Epithelial tumors increased in female mice treated with TCDD and HCDD. Mice painted with TCDD and HCDD showed increased tumors. DMBA pretreatment had no influence. TCDD and HCDD are therefore weak carcinogens when given orally and are complete carcinogens when applied externally.

79-0177. Berry, D. L.; Slaga, T. J.; DiGiovanni, J.; Juchau, M. R. (Oak Ridge Natl. Lab., Oak Ridge, TN) **Studies with chlorinated dibenzo- *p*-dioxins, polybrominated biphenyls and polychlorinated biphenyls in a two-stage system of mouse skin tumorigenesis: potent anti-carcinogenic effects.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

Laboratory studies revealed anti-carcinogenic effects of 2,3,7,8-tetrachloro dibenzo- *p*-dioxin (TCDD) or Aroclor 1254 (PCB) administered prior to exposure of female mice to polycyclic aromatic hydrocarbons (PAH), 7,12-dimethylbenz (a) anthracene (DMBA), and benzo (a) pyrene (BaP). The potency of the anti-carcinogenic effects correlate with (1) the production of epidermal moonoxygenase enzymes that convert PAH to receive intermediates, and (2) the reduction in DMBA bound to epidermal DNA and RNA (in vivo) but not protein.

79-0178. Allen, J. R.; Barsotti, D. A.; Lambrecht, L. K.; Van Miller, J. P. (Univ. Wisconsin, Madison, WI) **Reproductive effects of halogenated aromatic hydrocarbons on nonhuman primates.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

Studies were performed on the toxicity of polychlorinated and polybrominated biphenyl mixtures and 2,3,7,8-tetrachloro dibenzo- *p*-dioxin fed at low levels to female rhesus monkeys. Generally, the effects of the two are similar: modified serum estradiol and progesterone, difficulties with conception, early abortions and birth of undersized infants exhibiting slow growth, thymic involution, increased infection rates, and altered patterns of learning and behavior.

79-0179. Lucier, G. W. (Natl. Inst. Environ. Health Sci., Research Triangle Park, NC) **Developmental toxicology of the halogenated aromatics: effects on enzyme development.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

Studies were carried out to define structure- activity relationships for the effects of pure PCB congeners and 2,3,7,8-tetrachloro- dibenzo- *p*-dioxin (TCDD) on hepatic enzyme development. The compounds were administered to pregnant rats and selected enzyme activity was measured in fetus and offspring 6, 20, and 55 days after birth. Levels of benzpyrene hydroxylase and nonsteroid UDP glucuronyl transferase (UDPGT) were evaluated in offspring. Exposure of newborns to TCDD in milk caused inductive actions of TCDD. P448 dependent enzymes were induced by 3,4,3′,4′ - tetrachloro biphenyl (4-CB) in 6 and 20 day-old rats, whereas P450 dependent enzymes were induced by 2,4,5,2′, 4′,5 ′- hexachlorobiphenyl (6-CB). 6-CB was not teratogenic but 4-CB caused servere teratology. There was also a decrease of

UDPGT in adult male rats exposed neonatally to 4-CB, presumably resulting from altered imprinting of sexual differentiation of hepatic metabolism.

79-0180. Luster, M. I.; Faith, R. E.; Clark, G. (Natl. Inst. Environ. Health Sci., Research Triangle Park, NC) **Laboratory studies on immune effects of halogenated aromatics.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

An investigation of the immune effects of 2,3,7,8-tetrachloro- dibenzo- *p*-dioxin (TCDD) and 2,3,7,8-tetrachloro dibenzofuran (TCDF) was designed. One group of rats was exposed to TCDD through maternal dosing (5 μg/kg) on day 18 of gestation and on days 0, 7, and 14 of postnatal life. A second group of rats was given the same treatment on days 0, 7, and 14 of postnatal life only. Results indicated that humoral immune functions were not affected, but cell mediated immune functions were depressed up to 145 days in both groups, although less severely in the second group. Other studies involved brief exposure of mice spleens to TCDD in dimethylsulfoxide to test the effect on lymphocyte function. The data showed that DNA, RNA and protein synthesis were inhibited at concentrations less than 0.2 μ*M* TCDD in DMSO. In another investigation on the effects of TCDF on immune function in guinea pigs, it was discovered that TCDF-induced immunosuppression is similar to that of TCDD.

79-0181. Sharma, R. P.; Gehring, P. J. (Utah State Univ., Logan, UT 84321) **Effects of 2,3,7,8-tetrachloro dibenzo- *p* -dioxin (TCDD) on splenic lymphocyte transformation in mice after single and repeated exposures.** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

In order to study the effects of 2,3,7,8-tetrachloro dibenzo- *p*-dioxin (TCDD) on splenic lymphocyte transformation, mice were orally treated with 0.01, 0.1, 1 and 10 μ g TCDD/kg body wt/week for up to 8 weeks. Animals were then sacrificed at 2, 4 and 8 wk of exposure. Splenic lymphocytes were cultured *in vitro* with or without the presence of phytohemagglutinin, phytomitogen, and pokeweed mitogen, and incorporation of ^{3}H-thymidine was used as an indicator of blast formation. Even the lowest doses caused a marked increase in thymidine uptake, although it was found to be reversible in a relatively short period of time. High levels of TCDD showed a reduced response, indicating an immunosuppressive effect.

79-0182. Legator, M.; Biles, R.; Connor, T. (Univ. Texas Med. Br., Galveston, TX) **Dibromochloropropane (DBCP).** *N. Y. Acad. Sci. Sci. Week* June 21-30:; 1978.

Dibromochloropropane (DBCP), an industrial chemical, has been shown through animal toxicity data and observations of exposed workers to be a hazardous substance. Studies conducted in the late 1960's on structurally similar compounds showed that they affected the reproductive system. In 1973 and 1975, carcinogenic results were reported, and in 1975 mutagenic effects of DBCP were found. Recent studies on the sperm of workers exposed to DBCP show a significant increase in YY bodies, indicating that DBCP may cause segregation errors.

79-0183. Saito, S.; Tokunaga, Y.; Miyazawa, E.; Hoshino, M.; Kotake, K.; Momose, T.; Yamamoto, T.; Okudera, F.; Okudera, H. (Sch. Pharmacol., Fac. Med., Nippon Univ., Tokyo, Japan) **[General pharmacologic effects of polyoxin D.]** *Nichidai Igaku Zasshi (Med. J. Nippon Univ.)* 37(7): 777-790; 1978. (1 reference) (Japanese)

The pharmacologic effects of polyoxin D were examined in experimental animals; the antibiotic was administered as the free acid due to the inadequate solubility of the zinc salt, used as an agricultural fungicide. Polyoxin caused no significant changes in the hexobarbital sleeping times in male mice and did not prevent convulsions provoked by pentetrazole or picrotoxin. It did not alter the rectal temperature. Spontaneous movement was suppressed in the mouse at polyoxin D levels of more than 40 mg/kg. EEG changes recorded with chronically implanted electrodes consisted of spindle bursts and slow waves, consistent with the closed eyes and decrease in spontaneous movement of rabbits following iv administration at 1 mg/kg. Only slight effects were seen on respiratory and circulatory organs: a transient lowering of blood pressure and a decrease in respiratory amplitude at the lower dosage, and a slight respiratory depression and decrease in blood volume at the higher dosage. Polyoxin D at 1 μg to 1 mg/ml caused no significant changes in isolated perfused organs such as bronchi, blood vessels, stomach, ileum, bladder and colon. No changes in the effects of acetylcholine, adrenaline, atropine, histamine, and 5-HT on these organs were observed except for a slight decrease in movement of the atrium. Polyoxin D at 1-50 mg/kg iv had no effect on the tibial muscle of the cat and also did not exert an anti-ACh effect in rectus abdominis muscle of the frog at 1 μg/ml. Polyoxin D given po at 10-100 mg/kg had no significant effect on bile secretion in the rat.

79-0184. Kinebuchi, H.; Konno, N. (Sch. Public Health, Fukushima Prefect. Med. Coll., Fukushima, Japan) **[Increase and decrease of the neurotoxicity of leptophos, caused by administration of a critical dose in divided amounts.]** *Nippon Koshueisei Zasshi (Jpn. J. Public Health)* 25(7): 393-397; 1978. (7 references) (Japanese)

The effects of the dose administration schedule on the neurotoxicity of leptophos administered po to hens in divided fractions of the single critical dose of 250 mg/kg body weight were investigated. Forty hens divided into eight groups of five birds each were given a po dose of leptophos in salad oil in the following dose schedules: group I, 250 mg/kg in a single dose; group II, 125 mg/kg daily for two consecutive days; group III, 83 mg/kg daily for three consecutive days, group IV, 50 mg/kg daily for five consecutive days; group V, 50 mg/kg every other day for a total of five doses; group VI, 50 mg/kg every three days for a total of five doses; group VII, 50 mg/kg every four days for a total of five doses; and group VIII, 50 mg/kg every five days for a total of five doses.

Another 20 hens were divided into four groups and the leptophos administration was carried out as follows: group IX, 25 mg/kg daily for ten consecutive days; group X, 10 mg/kg daily for 25 consecutive days; group XI, 7.5 mg/kg daily for 33 consecutive days; and group XII, 5 mg/kg for 50 consecutive days. The neurotoxicity of leptophos was not rapidly apparent in group VI to which leptophos was administered at 50 mg/kg every three days. All five birds of this group showed ataxia within five days after the last dose administration, and four birds died due to rapid aggravation of the paralysis. These findings suggest that leptophos is absorbed more effectively by administration of divided amounts of the critical dose than by administration of a single dose at the critical level. However, the toxicity of leptophos should be considered in relation to its biological half life in the adipose tissue of the bird. Leptophos lost its registration as an agricultural chemical on December 9, 1977 by decision of the Minister of Agriculture and Forestry.

79-0185. Nishimura, K.; Narahashi, T. (Dep. Physiol. & Pharmacol., Med. Cent., Duke Univ., Durham, NC 27710) **Stucture-activity relationships of pyrethroids based on direct action on nerve.** *Pestic. Biochem. Physiol.* 8(1): 53-64; 1978. (16 references)

The structure-activity relationships of 30 synthetic pyrethroids were studied by measurements of their direct action on isolated crayfish nerve cords. The concentrations of pyrethroids varied from 0.01 μM to 10 μM. The indices of nerve action were the concentrations of pyrethroids used to increase the frequency of spontaneous discharges to 200% of the control (NS_{200}), those used to decrease the frequency back to normal, and those used to further decrease the frequency to 10% of the control. These values were not parallel with LD50 or knock-down 50 dosages. Large differences in the NS_{200} were found, with a greater nerve stimulating action usually found in the (+) form of the compound. Addition of chlorine and changes in the location of double bonds in the pyrethroids also changed the nerve stimulating action. The degree of direct action on the target site is needed to help establish the true structure-activity relationships of synthetic pyrethroids.

79-0186. Lee, P. W.; Allahyari, R.; Fukuto, T. R. (Div. Toxicol. & Physiol., Dep. Entomol., Univ. California, Riverside, CA 92521) **Studies on the chiral isomers of fonofos and fonofos oxon: III. *In vivo* metabolism.** *Pestic. Biochem. Physiol.* 9(1): 23-32; 1978. (9 references)

The *in vivo* metabolism of the enantiomers of fonofos and fonofos oxon in the house fly (*Musca domestica*) and the white mouse was examined. House flies were treated topically with 6.5 μg/g of each of the enantiomers. Results showed that about 20% of those treated with (R)p-fonofos were down 6 hr after treatment and the other 80% showed symptoms of cholinergic poisoning. Flies treated with the (S)p isomer showed no intoxication. Mice were treated with 4 and 8 mg/kg of the chiral isomers of fonofos. Those treated with 8 mg/kg of (R)p-fonofos showed symptoms of poisoning 4 hr after treatment. Those treated with 8 mg/kg of the (S)p isomer and 4 mg/kg of the (R)p isomer showed mild signs of poisoning. Mice treated with 4 mg/kg of (S)p-fonofos were unaffected. The white mice were also treated with 4 mg/kg of fonofos oxon enantiomers. Those treated with the (S)p isomer showed relatively mild cholinergic poisoning symptoms, while those treated with the (R)p isomer showed no symptoms.

79-0187. Robinson, K. M.; Yarbrough, J. D. (Dep. Zool., Mississippi State Univ., Mississippi State, MS 39762) **A study of liver function in rats with mirex-induced enlarged livers.** *Pestic. Biochem. & Physiol.* 9(1): 61-64; 1978. (17 references)

Sulfobromophthalein (BSP) clearance, hepatic cytochrome P450 concentration, serum total protein concentration and electrophoretic pattern, serum total lipid concentration, serum glucose concentration, and liver response to epinephrin were used to assess the functional capacity of mirex-induced enlarged livers in rats. The experimental animals were given 100 ppm mirex in corn oil orally. The tests were performed 4 days after treatment except for serum total lipid concentration, which was determined 2, 4, and 7 days after treatment. Mirex had no effect on serum total lipid concentration, or serum protein electrophoretic pattern. However, mirex treated rats showed less serum glucose, enhanced rate of BSP clearance, increased liver microsomal cytochrome P450 concentration, and increased liver weight/body weight ratio in comparison with control rats.

79-0188. Brimfield, A. A.; Street, J. C.; Futrell, J.; Chatfield, D. A. (Interdep. Program Toxicol., Utah State Univ., Logan, UT 84322) **Identification of products arising from the metabolism of *cis*- and *trans*-chlordane in rat liver microsomes *in vitro*; outline of a possible metabolic pathway.** *Pestic. Biochem. Physiol.* 9(1): 84-95; 1978. (22 references)

An *in vitro* chlordane incubation was performed in washed rat liver microsomes to develop a gas chromatographic method for quantitating the metabolites of chlordane and to further explore the mode of action of the liver microsomal xenobiotic metabolizing enzymes on isomers of chlordane. The results of the combined gas chromatography- mass spectroscopy studies showed that *cis*-chlordane, after *in vitro* metabolism, yielded *cis*-chlordane, dichlorochlordene, oxychlordane, dihydro heptachlor, hydroxychlordene, and 1-chloro- 2-hydroxy- dihydrochlordene; *trans*-chlordane yielded *trans*-chlordane, dichloro chlordene, oxychlordane, heptachlor, 1-chloro- 2-hydroxy- dihydrochlordene, hydroxychlordene, and hydroxychlordane.

79-0189. Shono, T.; Unai, T.; Casida, J. E. (Pestic. Chem. & Toxicol. Lab., Dep. Entomol. Sci., Univ. California, Berkeley, CA 94720) **Metabolism of permethrin isomers in American cockroach adults, house fly adults, and cabbage looper larvae.** *Pestic. Biochem. Physiol.* 9(1): 96-106; 1978. (17 references)

In a study carried out to determine the metabolism

fate of *trans*-permethrin and *cis*-permethrin, American cockroach (*Periplaneta americana* L.) adults were injected with 1.0 μg of *trans*- or *cis*-permethrin in acetone: water. Insecticide resistant adult houseflies were also treated topically with 0.01 *trans*-permethrin or 0.0075 μg *cis*-permethrin in acetone, and fifth instar cabbate looper larvae were treated topically with 0.01 μg of *trans*-permethrin or 0.0075 μg of *cis*-permethrin in acetone. The permethrin isomers were found to have been metabolized by many pathways in the insects studied, leading to 42 tentatively identified metabolites. In cabbage looper larvae and houseflies the *cis* isomer was more resistant to metabolism than the *trans* isomer. and in general it can be said that *cis*-permethrin is the more insecticidal isomer.

79-0190. Schuphan, I.; Ebing, W. (Inst. Pestic. Res., Fed. Biol. Res. Cent. Agric. & Forestry, D-1000 Berlin 33, Germany) **Metabolism and balance studies of [^{14}C] monolinuron after use in spinach followed by cress and potato cultures.** *Pestic. Biochem. Physiol.* 9(1): 107-118; 1978. (17 references)

Soil was treated with 0.448 mg of radioactively labeled monolinuron in a closed system to study its metabolism. Spinach was planted in the soil and was harvested 31 days later. Afterwards cress was planted which was harvested 10 days later, and finally potatoes were cultivated and harvested 84 days later. It was found that 4.1% of the radioactivity applied was recovered in the spinach, 5.6% was recovered in the cress, 9.5% was recovered in the old tubers and roots of the potatoes and the leaves, and 1.01% was recovered in the new tubers. In spinach, 10.6% of the extractable radioactivity was found to be monolinuron, 12% was 4-chlorophenylurea and 4-chlorophenyl-hydroxy- methylurea, 3.7% was 4-chlorophenyl methylurea, 1.4% was 4-chloro-phenyl-hydroxymethyl- methoxyurea, (CPHMMU) 1.1% was 4-chlorophenyl- methoxyurea, and 71.2% was polar metabolites. CPHMMU is believed to be formed by an oxidative attack on the *N*-methyl group.

79-0191. Ioannou, Y. M.; Dauterman, W. C. (Toxicol. Program, Dep. Entomol., North Carolina State Univ., Raleigh, NC 27650) ***In vitro* metabolism of etrimfos by rat and mouse liver.** *Pestic. Biochem. Physiol.* 9(2): 190-195; 1978. (16 references)

Experiments were conducted to study *in vitro* metabolism of the pesticide etrimfos (*O,O*-dimethyl- *O*-2-ethyl-4-ethoxy- 6-pyrimidinyl phosphorothionate) by rat and mouse liver. Glutathione, NADPH, and labeled pesticide were incubated for 1 hr at 37°C. Metabolites were then separated by thin layer chromatography. Etrimfos was rapidly degraded to desmethyl etrimfos and EEPH (2-ethyl-4-ethoxy- 6-hydroxy pyrimidine). The toxicity of etrimfos was higher in mice because mice liver contains less glutathione than rat liver dose. Approximately 48% of the etrimfos was degraded by rat liver preparations, and 28% by mouse liver preparations.

79-0192. De Matteis, F. (Biochem. Pharmacol. Sect., Toxicol. Unit., Med. Res. Counc. Labs., Carshalton, Surrey, England) **Loss of microsomal components in drug-induced liver damage, in cholestasis and after administration of chemicals which stimulate heme catabolism.** *Pharmacol. Ther. Part A* 2(4): 693-725; 1978. (223 references)

Microsomal changes observed in a variety of pathological conditions are reviewed. Major emphasis is placed on the chemical and biochemical changes which are observed in the endoplasmic reticulum. Administration of various toxic chemicals has caused varying degrees of microsomal damage. These chemicals are divided into three classes: 2-allyl- 2-isopropyl acetamide and related chemicals containing at least one allyl or similar side unsaturated chain; carbon disulfide and other sulfur containing compounds of the thiono type; and carbon tetrachloride. Discussion is given to the degradation of the heme of cytochrome P450 into abnormal pigments, structural requirements for drug-induced conversion of heme into green pigments, mechanisms involved in the destruction of liver heme, a possible relationship of the loss of liver heme to the stimulation of 5-aminolevulinate synthetase caused by AIA type compounds, significance of carbon disulfide metabolism for microsomal membrane damage, and the role of metabolic activation of carbon tetrachloride and of lipid peroxidation.

79-0193. Manis, J.; Kim, G. (Dep. Med., State Univ. New York, Brooklyn, NY 11203) **Stimulation of iron absorption by polychlorinated aromatic hydrocarbons.** *Physiologist* 21(4): 76; 1978.

TCDD (single dose) increased iron absorption by 30 to 100% in rats. The increase was noted by measuring with duodenal loops *in vivo* and by everted duodenal gut sacs *in vitro*. The effect was specific for the second step of the iron transport mechanism, that is, movement of iron from the mucosal cell into the blood or serosal fluid. Maximal iron absorption was observed one to two days after treatment with 30 μg/kg of TCDD. By 4 days after treatment, the effect was no longer noticeable. Iron transport was stimulated to similar degrees by both oral and ip treatment. TCDD also decreased calcium transport. DDT (single dose of 200 mg/kg) increased iron transport at the second step as well. Aryl hydrocarbon hydroxylase activity (AHH) increased in the intestine of rats treated with TCDD. This increase was concomitant with the increase in iron transport. AHH induction persisted for up to 14 days. DDT minimally affected AHH activity in the gut in spite of the significant increase that DDT caused in iron transport. Similar effects on hepatic AHH activity were caused by TCDD and DDT. It was suggested that the intestinal iron transport process is stimulated by a mechanism separate from that for AHH. Contamination of the environment with TCDD and DDT may significantly effect intestinal absorptive pathways in exposed human or animal groups.

79-0194. Leroux, P.; Gredt, M. (Lab. Phytopharm., Inst. Natl. Rech. Agron, CNRA., F-78000 Versailles, France.) **Etude de l'Action Antagoniste d'Acides gras, de Sterols, et de divers derives Isopreniques vis a vis de quelques Fongicides. [Antagonistic effects of fatty acids, sterols and various**

isoprenoid compounds on the toxicity of some fungicides.] *Phytopathol. Z.* 91(2): 177-81; 1978. (8 references) (French)

The inhibitory effect of cholesterol, erogosterol, progesterone, testosterone, vitamin A, alpha-tocopherol, linoleic, palmitic, and stearic acids, β-carotene, farnesol, squalene and Tween 20 (polyethylene sorbitol monolaureate) on the toxicity of the fungicides carbendazim, dichlofluanide, Imazalile, Triadimefon, triarimol, tridemorph, and Iprodione (260 RP or Glycophene) towards strains of *Botrytis cinerea* sensitive to fungicides was studied. The antagonist and the fungicide were incorporated in a nutrient medium in Petri dishes, and a mycelium of *Botrytis cinerea* was added. The daily growth zone diameter of the fungi over a period of one week was measured. While the fungicides Imizalile, Triadimefon, and triarimol interfere with the sterol synthesis of fungi, Iprodione acts on their nucleic acids, carbendazim possesses antimitotic properties, tridemorph inhibits protein synthesis and dichlorfluanide affects respiration. Of all the substances tested only erogosterol was found to be specific in that it inhibited the toxicity of only those fungicides interfering with the biosynthesis of sterols; all the other substances tested were non-specific because they reduced the fungicidal activity of compounds with different modes of action. The results of the study are tabulated indicating the strength of the antagonistic action of each substance tested.

79-0195. Sell, J. L.; Davison, K. L.; Bristol, D. W. (Anim. Sci. Dep., North Dakota State Univ., Fargo, ND 58102) **Depletion of dieldrin from turkeys.** *Poult. Sci.* 56(6): 2045-2051; 1977. (22 references)

Two experiments were conducted with large-type, male turkeys to investigate ways in which the elimination of dieldrin in body tissues might be accelerated. In experiment 1, 11-wk-old turkeys were given 0.30 ppm dietary dieldrin for 5 days. After treatment, dieldrin conccentration in body fat was 1.64 ppm. The turkeys were divided into five treatment groups and the rate of decline in tissue dieldrin was determined periodically during a 68-day period. Compared to a normal feeding program, the use of a ration high in fiber (33% ground alfalfa) or a ration high in energy and protein did not accelerate dieldrin depletion from body fat. Decline in tissue dieldrin was not changed by depriving the turkeys of feed for the first five days of the depletion period, followed by a normal feeding schedule. Sodium barbital, an inducer of mammalian hepatic enzymes, administered in the drinking water did not increase elimination of dieldrin from the turkeys. In experiment 2, 12-wk-old turkeys were used. The turkeys were fed 0.29 ppm dieldrin for 5 days, at which time the average dieldrin concentration in the adipose fat was 1.33 ppm. The turkeys were divided into two treatment groups. One group was fed a normal ration program for 61 days. The second group was subjected to three successive periods of fasting (7, 7 and 4 days, respectively) interrupted by periods of feeding (7, 12 and 24 days, respectively). Periodic fasting was effective in accelerating the decline in both the concentration of dieldrin in body fat and the total amount of dieldrin in the carcasses of the turkeys. (Author abstract by permission)

79-0196. Kosinova, N. R.; Aleksay'yan, O. M. (Azov Sci. Res. Inst. Fish., Rostov-na-Donu, USSR) **Izuchenie obratimosti -eistviya strontsiya-90 i metafosa na *Cyprinus carpio.* [Recovery after toxic effects of Strontium-90 and metaphos on *Cyprinus carpio.*]** *Radiobiologiya* 18(4): 630-634; 1978. (4 references) (Russian)

The normalization of some physiological parameters of carp was studied over a 45-day period after they were kept for 30 days in water containing ^{90}SC (0.10 μCi/l), metaphos (methyl parathion) (0.01 mg/l) or both (groups 1, 2 and 3, respectively). During the exposure to metaphos, the SH-group level increased to 191.6% of the control value, the peroxidase activity dropped to 50%, and the acetylcholinesterase activity increased 120%. All values normalized 25-30 days after the fish were transferred into clean uncontaminated water. The experiment with joint exposure to ^{90}Sr and metaphos showed that, compared with exposure to Sr only, metaphos accelerated the elimination of Sr in the brain tissue, and also the normalization of the altered biochemical parameters, including the reduction of the increased oxygen consumption.

79-0197. Holt, T. M.; Hawkins, R. K. (Dep. Anat., Coll. Med., Univ. Southern Florida, Tampa, FL 33612) **Rat hippocampal norepinephrine response to cholinsterase inhibition.** *Res. Commun. Chem. Pathol. Pharmacol.* 20(20): 239-251; 1978. (20 references)

Rats were exposed to the insecticide disulfoton (a cholinesterase inhibitor), and the effect of the chemical on hippocampal norepinephrine levels was determined. Experimental groups were given either a single injection of 1.2 mg/kg disulfoton, or a series of daily injections of 1.0 mg/kg dilsulfoton. Animals were sacrificed at various time intervals after injection. The brains were then removed and the hippocampi were separated by dissection. The hippocampal norepinephrine (NE) levels were determined spectrofluorometrically. The results obtained from animals receiving a single injection showed that a significant decrease in NE levels appeared 3 hr after injection with disulfoton, and continued to last up to 48 hr. At 120 hr, the NE levels were indistinguishable from those of the controls. The NE levels of the group receiving repeated daily injections dropped similarly, but tests carried out over a period of 14 days showed no cumulative effects in NE reduction.

79-0198. Garszel, J.; Cledzka, R. (Inst. Biopharm., Acad. Med., Warsaw, Poland) **Badania nad wplywem chlorfenwinfosu i karbarylu na metabolizm wapnia i fosforu w kosciach szczurow. III: Wyjasnienie niektorych aspektow mechanizmow daizlania chlorfenwinfosu i karbarylu na metabolizm mineralny kosci. [Investigation into the effects of chlorfenvinphos and carbaryl on calcium and phosphorus metabolism in rat bonew. III: Some aspects of the mechanisms of action of chlorfenvinphos and carbaryl on metabolism of minerals in the bones.]** *Rocz. Panstw. Zakl. Hig.* 29(3): 249-254; 1978. (13 references) (Polish)

The influence of diet (with high or low calcium con-

tent, abnormal calcium: phosphorus ratio, or with or without vitamin D_3) on the effects of chlorfenvinphos (0.10 of LD50, 10 days) and carbaryl (0.025 of LD50, 10 days) on calcium and phosphorus turnover in the bones of rats was studied. Chlorfenvinphos was found to release calcium from the bones; this action was strongest in animals kept on low-calcium diet with high doses of vitamin D_3. Carbaryl, on the other hand, showed the strongest action in animals on normal diet. The results obtained suggest that the calcium turnover-stimulating effect of chlorfenvinphos may be due to activation of vitamin D_3 metabolism by this pesticide, and that the effect of carbaryl may be due to its interference with the production or metabolism of vitamin D_3 or parathyroid hormone, or to the stimulation of calcitonin release.

79-0199. Tyburczyk, W.; Borkowska, J.; Cechowicz, R.; Choragiewicz, H.; Klimek, K. (Inst. Med. Res. & Hyg., P-20950 Lublin, Poland) **Ustalenie dawki progowej karbarylu w eksperymencie ostrym i podostrym. [Establishing the threshold dose of carbaryl in acute and subacute experiment.]** *Rocz. Panstw. Zakl. Hig.* 29(3): 255-261; 1978. (23 references) (Polish)

The effect of carbaryl on the biochemical parameters of the heart blood, brain and adrenal glands was studied in male Wistar rats treated with single doses of 6.4 mg/kg (0.1 LD50) and 0.05 LD50 ip, or with 0.05 LD50 doses ig for 30 days. The parameters studied included the calcium, total phosphorus, inorganic phosphorus, lipids, fatty acids, cholesterol, glucose, hydroxyproline, amine nitrogen, ascorbic acid, corticosterone, serotinin, protein, hemoglobin levels, cholinesterase activity, erythrocyte and leukocyte counts, hematocrit, color index of the blood, dopamine, norepinephrine, and serotonin levels. Acetylcholinesterase activity of the brain was studied as well as the epinephrine, norepinephrine and dopamine levels of the adrenal glands. The 0.05 LD50 dose failed to cause any significant changes in the biochemical parameters in both the acute and subacute experiments. An increase in serotonin level in the blood and brain was only affected by the higher carbaryl dose of 0.1 LD50. These findings suggest that the highest nontoxic dose of carbaryl for rats is 0.05 LD50.

79-0200. Jurek, A. (Dep. Sanit. Toxicol., Natl. Inst. Hyg., P-00791 Warsaw, Poland) **Przewlekla dlugookresowa toksycznosc karbaminianu propoksuru. [Long-term chronic toxicity of the carbamate propoxur.]** *Rocz. Panstw. Zakl. Hig.* 29(3): 327-338; 1978. (14 references) (Polish)

The effect of chronic oral poisoning with propoxur on male and female Wistar rats was studied. The animals were kept on a diet containing 50, 200 or 800 mg of propoxur/kg for 18 mo. Propoxur caused no reduction in the food consumption and in the weight gain compared with the untreated animals. The cholinesterase activity of the whole blood and plasma was not inhibited up to the ninth month of the experiment. Inhibition of cholinesterase activity in the brain tissue and whole blood was seen immediately after the 18 mo experiment in animals treated with 800 mg/kg propoxur in the diet. The carboxyl esterase, lactate dehydrogenase, acid and alkaline phosphatase, and glutamate and aspartate transaminase activities remained normal. Histological examination of selected internal organs failed to show any specific changes. Accepting 200 mg/kg as the maximum no-effect concentration of propoxur in the diet of rats, the allowable daily intake for man is 0.1 mg/kg.

79-0201. Rane, P. D.; Mathur, D. S. (Cent. Reg. Stn., Zool. Surv. India, Jabalpur, India) **Toxicity of aldrin to *Rana cyanophlyctis* (Schn).** *Sci. Cult.* 44(3): 128-130; 1978. (7 references)

The purpose of this investigation was to test the effect of aldrin on the skipper frog (*Rana cyanophlyctis*). Frogs of various weights were exposed to different concentrations of aldrin. The lower concentrations (0.006 ppm) had a very mild effect on the frogs, while the higher concentrations (0.125 ppm) definitely increased the mortality rate. At the higher concentrations, a debilitating effect, as evidenced by erratic swimming and loss of equilibrium, occurred within 30 min after the onset of treatment. In general, the larger sized frogs appeared to be more sensitive than the smaller ones.

79-0202. Atlas, R. M.; Pramer, D.; Bartha, R. (Dep. Biol., Univ. Louisville, Louisville, KY 40208) **Assessment of pesticide effects on non-target soil microorganisms.** *Soil Biol. Biochem.* 10(3): 231-239; 1978. (16 references)

The effects of pendimethalin, difenzoquat, and thiobencarb (herbicides), and folpet and captafol (fungicides) on soil microoorganisms were studied. Effects of these various chemicals were measured on the growth rate of soil microorganisms, carbon cycling, nitrogen cycling, sulfur cycling, and soil enzymes. None of the test compounds exhibited more than a mild or transient effect on any of the test parameters. The addition of the herbicide and fungicides usually resulted in a slight increase in carbon dioxide production which could have resulted in part from pesticide biodegradation or might merely reflected an increased turnover of organic carbon in treated soils. No significant effects on nitrogen or sulfur cycling were noted. Significantly lower dehydrogenase activity was recorded in captafol- and folpet-treated soils during 21 days after application. Neither fungicide affected soil phosphatase activity.

79-0203. Ceausescu, S.; Stancioiu, N.; Stefan, A.; Ionita, E. (Lab. Biochem., Fac. Biol., Bucharest 34, Romania) **Actiunea diazinonului asupra formarii si dezvoltarii embrionilor de *Gallus domesticus*. [Action of diazinon on the formation and development of *Gallus domesticus* embryos.]** *Stud. Cercet. Biochem.* 21(1): 27-30; 1978. (16 references) (Rumanian)

The effect of diazinon on embryogenesis was studied in chickens, *Gallus domesticus*. The eggs were immersed in 20%, 10%, 5%, 2.5% or 1% acetone solutions of diazinon, or in actone alone for 30 sec immediately before incubation. Treatment with the 5-20% concentrations caused 100% embryo meortality, and many of the embryos were malformed.

After treatment with 2.5% and 1% concentrations of diazinon as well as with acetone, the respective mortality rates were 70%, 50%, and 6%, versus 0% in the untreated controls. Some embryos, hatched or unhatched, showed malformations. Many of the hatched chicks showed reduced viability, anorexia, and excessive nervousness, which is indicative of acetylcholinesterase inhibition. The impaired embryogenesis is interpreted as a sign of the inhibition by diazinon of some enzymes which are essential for normal vital functions (glucose-6- phosphate dehydrogenase, cytochrome oxidase, succinate dehydrogenase, and glutamate dehydrogenase).

79-0204. Lenner, V.; Kuemmerle, F. (Chirurg. Klin., Univ. Mainz, Mainz, Germany) **Chirurgische Behandlung der Nebennierentumoren. [Surgical treatment of adrenal tumors.]** *Therapiewoche* 28(30): 5569-5578; 1978. (28 references) (German)

The study analyzes the therapeutic results achieved by radical and conservative methods in treating 128 patients afflicted with Conn's syndrome (primary hyperaldosteronism), Cushing's syndrome (overproduction of glucosteroids), the androgenital syndrome (AGS) and pheochromocytoma. In treating patients afflicated with the AGS in the form of inoperable metastatic adrenocortical carcinoma, therapy with the insecticide *o,p'*-DDD (TDE) is recommended without further elaboration on the subject.

79-0205. De M. Barros, S. B.; Saliba, A. M. (Dep. Anal. Clin. Toxicol., Fac. Cienc. Farm., Univ. Sao Paulo, Sao Paulo, Brazil) **Toxicity of the hexachlorocyclohexane in rats.** *Toxicology* 10(3): 271-279; 1978. (50 references)

HCH (BHC) was given in the diet to 60-day-old male rats at levels of 0, 0.9, and 900 ppm for a period of 90 days. At 900 ppm significant growth retardation was noted along with increased relative liver weight. At 0.9 ppm a significant reduction of blood glucose levels were seen while liver glycogen and G-6-Pase levels remained unaffected at any dose level. The liver and kidneys alone revealed histological and histochemical changes which included steatosis and necrosis in the liver and steatosis and gutalar hyaline degeneration in the kidneys. The kidney damage was only observed in animals receiving 900 ppm dose levels.

79-0206. Penumarthy, L.; Oehme, F. W.* (Comp. Toxicol. Lab. Dept. Surg. Med., Kansas State University, Manhattan, KS 66506) **Treatment and prothrombin responses during warfarin toxicosis in rats and mice.** *Toxicology* 10(4): 377-401; 1978. (28 references)

Studies were designed to test the effect of warfarin on prothrombin time and to determine the ability of whole dog blood, vitamin K-3 (menadione sodium bisulfite), and vitamin K-1 (phytonadione) to counteract warfarin toxicosis. Experimental animals were rats and mice, and they were randomly divided into groups and exposed to warfarin and simultaneously treated with whole dog blood, vitamin K-1 or vitamin K-3. The number of days that each group was exposed to warfarin and the amount of vitamin solution or blood used in the treatment varied in each group. Exposing mice to warfarin only (with no other treatment) caused a significant increase in prothrombin time (from 9.5-12 seconds to 15 seconds) with in 6 hours. A dramatic increase (> 300 seconds) occurred 18 hours after exposure to warfarin, representing a serioud depression in clotting ability. The whole blood and vitamin K-3 treatments had no marked beneficial effect on the prothrombin times of animals exposed to warfarin. However, after the withdrawal of warfarin, animals treated with vitamin K-3 or whole blood returned to normal prothrombin times sooner than animals receiving no treatment. On the other hand, vitamin K-1 treatment administered 48 hr after warfarin exposure caused a dramatic return to normal prothrombin times.

79-0207. Abou-Donia, M. B. (Dep. Pharmacol., Med. Cent., Duke Univ., Durham, NC) **Increased acid phosphatase activity in hens following an oral dose of leptophos.** *Toxicol. Lett.* 2(4): 199-203; 1978. (25 references)

Studies were conducted to determine the acid phosphatase and cholinesterase (ChE) activity in hens following the administration of leptophos. Fifteen hens were given subneurotoxic oral doses of 50 mg/kg. Three hens were killed after 0.5, 2, 4, 8, and 20 days. At no time did any signs of ataxia, histological changes or weight variations occur. This dose did, however, significantly inhibit plasma ChE (reduced to 80% of control), but spontaneous recovery of the enzyme began after 5 days. Acid phosphatase activity increased greatly following the 50 mg/kg dose. By the fifth day, however, enzyme activity was lower than in the controls, and by day 20 the activity had further decreased to less than 60% of the activity in the control group.

79-0208. Baksi, S. N. (Environ. Toxicol. Br., NIEHS, NIH, Research Triangle Park, NC 27709) **Effect of dichlorvos on embryonal and fetal development on thyro parathyroidectomized, thyroxine- treated and euthyroid rats.** *Toxicol. Lett.* 2(4): 213-216; 1978. (10 references)

Studies were conducted to determine the effect of dichlorvos on development in thyro parathyroidectomized, thyroxine- treated and euthyroid rats. Twenty-five mg/kg/day of the insecticide was administered to the rats on days 8 through 15 of gestation. Dichlorvos administration during gestation had slight but non-significant effects on fetal weights in all groups. There was no significant difference in fetal anomalies due to altered thyroid status and administration of dichlorvos. Dichlorvos is concluded by the author to be non-teratogenic in rats, contrary to previously published reports.

79-0209. Bonnevie, P. (Arendalsgade 3, DK-2100 Copenhagen O, Denmark) **Historien om PCDD-dioksiner. [History of PCDD dioxins.]** *Ugeskr. Laeg.* 140(4): 190-192; 1978. (14 references) (Danish)

The general environmental and toxicological prob-

lems of 2,3,7,8-tetrachloro- dibenzo-*p*- dioxin (TCDD) and 1,2,3,4,7,8- hexachloro- dibenzo dioxin (HCDD), undesirable byproducts produced during the synthesis of 2,4,5-T, are discussed. The LD50 values of TCDD and HCDD are 10 μg/kg and about 100 mg/kg, respectively, in rats. TCDD is absorbed through the skin; its percutaneous LD50 in rabbits is only twice as high as the oral LD50. These substances cause acne, liver damage including cirrhosis and porphyria cutanea tarda, and psychoneurological disorders. Animal tests indicate the existence of teratogenic effects of TCDD and HCDD.

79-0210. Padalkin, I. Ya. (All-Union Sci. Res. Inst. Non-Infect. Dis. Anim., USSR) **Toksichnost' vitavaksa dlya kur. [Toxicity of vitavax in hens.]** *Veterinariya* (6): 85-86; 1978. (Russian)

The acute and chronic toxicity of vitavax (carboxin) was studied in hens. The acute oral LD50 was found to be 24,000 mg/kg. Loss of appetite, depression, cyanosis of the comb, marked asthenia, and sometimes diarrhea were the symptoms of acute poisoning. The gizzard was inflamed. Vitavax was retained in the crop for up to 14 days after poisoning. In the chronic experiments, the hens were treated with doses corresponding to 0.01, 0.2 and 0.4 of the LD50 for 5.5 months. Chronic poisoning caused pathoanatomical changes in the digestive tract and cardiovascular system, significant reduction of the erythrocyte count, and increased albumin-globulin ratio. The cumulation factor was over 5. Some animals died even in the group treated with the lowest dose. Poultry poisoned with vitavax should not be slaughtered for human consumption until 2 weeks have elapsed.

79-0211. Rakhmatov, U. A. (Uzbek Sci. Res. Inst. Vet. Med., Uzbek, USSR) **Toksikologicheskaya otsenka produktov uboya zhivitnykh pri otravlenii ritsidom. [Toxicological assessment of meat products from animals poisoned with ricid.]** *Veterinariya* (7): 86-88; 1978. (Russian)

The accumulation of ricide (IBP, *O,O*-diethyl- *S*-benzyl thiophosphate) in the organs of sheep and the toxicity of the meat of poisoned sheep were studied. Eight sheep with a body weight of 28-30 kg were treated with 5 mg/kg doses of ricid p.o. for 40 days. The first symptoms of poisoning appeared 15-16 days after the beginning of treatment; they included loss of appetite, miosis, salivation, lacrimation, weight loss, and significant reduction of the acetylcholinesterase activity (by 55%) by the end of the treatment. Ricide was found to accumulate in all organs investigated (brain, muscles, fat, heart, liver, kidneys, and lungs). The ricide levels ranged from traces to 0.40 mg/kg. The meat of the animals slaughtered during or a few days after the treatment had impaired organoleptic and biochemical properties, but the meat of the animals slaughtered 7 days after the treatment appeared normal. In another experiment, rats were fed meat containing 0.3 mg/kg ricide for 30 days. While there were no visible signs of poisoning, the acetylcholinesterase activity was 47% lower than in the control at the end of the treatment. The findings indicate that animals poisoned with ricide should not be slaughtered for human consumption until after 20 days have elapsed.

79-0212. Bolokhovets, M. F. (All-Union Sci. Res. Inst. Vet. Hyg., Moscow, USSR) **Diagnostika otravlenii zookumarinom. [Diagnosis of poisoning by zoocoumarin.]** *Veterinaryia* (7): 89-91; 1978. (Russian)

The acute and chronic toxicity of zoocoumarine was studied in rabbits and rats. The rabbits were given single oral doses of 5-150 mg/kg. The rats were treated with dose of 2.5-10 mg/kg body weight p.o. in the acute toxicity tests, and with doses of 0.1-1 mg/kg of feed in the long-term tests for 126 days. Zoocoumarin was only weakly resorbed from the stomach, but the resorbed portion accumulated in the organs, including those with low lipid content. A single dose of 5 mg/kg caused no deaths among the rabbits; those treated with higher doses died in a few days. The animals treated with doses of 1 mg/kg feed died after 90-100 days of treatment. The poisoning symptoms included general depression, bloodly discharges, paleness of the mucosa, petechie in the subcutaneous fat, reduced blood clotting, and sometimes reddish violet spots on the skin. Zoocoumarin undergoes hydroxylation in the liver, and is excreted mainly with the urine in intact form and in the form of metabolites. The findings indicate that complex clinical, pathoanatomical, and chemical toxicological examinations are necessary for the diagnosis of zoocoumarin poisoning.

79-0213. Bestetti, G.; Soffietti Gennar, M. (Author address not given) **Changes in the chicken thyroid after administration of zink [sic] ethylene dithiocarbamate during 24 months.** *Vet. Pathol.* 15(4): 575; 1978.

Zinc ethylene *bis* dithiocarbamate (zineb), administered at high doses for a long time to chickens, caused changes in the thyroids. Toxic colloid goiter appeared after 6 mo of administration, and a different form of goiter, with signs of hypo- and hyperfunction of the thyroid epithelium, appeared after 12 mo. After 24 mo of administration the epithelium was hyperplastic, and the stroma of the thyroid was infiltrated with lymphocytes, heterophils and plasma cells. This reaction may represent an immune response. These long term experiments may suggest a model for the study of inflammatory processes with an immunologic component in the thyroid. (Paper presented at the 26th meeting of the European Association of Veterinary Pathologists in Erlangen, Germany.)

79-0214. Kuz'minskaya, Y. A.; Ivanitskii, V. A. (Biochem. Lab., All-Union Sci. Res. Inst. Hyg. & Toxicol. Pestic. Polym. & Plast., Kiev, USSR) **Funktsional'noe sostoyanie simpato-adrenalovoi sistemy v usloviyahk vozdeistviia khloroganicheskikh pestitsidov. [Functional composition of the sympatho-adrenal system under the effect of organochlorine pesticides.]** *Vrach. Delo* (6): 127-130; 1978. (9 references) (Russian)

A study was conducted to determine the nature of

excretion of catecholamines, their predecessors, and metabolites when the organochlorine pesticides, polychlorinated camphene (PCC) and γ- hexachloro cyclohexane (γ-BHC, lindane), come in contact with humans and animals. The experiment was conducted on 120 white rats, 15 patients exposed to γ-HCH for 36 yr and 15 people with no contact with the compound. The animals received; PCC, 20 mg/kg (0.5 LD50) once and 2.5 mg/kg/dx (0.01 LD50) 1,3,6 mo; γ -HCH, 3.4 mg/kg (0.02 LD50) x 3 mo. The level of catecholamines was measured fluorometrically daily. It was found that organochlorine pesticides caused disfunction of the sympatho-adrenal system. PCC and γ-HCH of various chemical compositions affect in different ways the excretion of catecholamines, their predecessors, and metabolites.

79-0215. Smith, A. E.; Briggs, G. G. (Rothamsted Exp. Stn., Harpenden, Hertfordshire AL5 2JQ, England) **The fate of the herbicide chlortoluron and its possible degradation products in soils.** *Weed Res.* 18(1): 1-7; 1978. (9 references)

Chlortoluron had a half-life in soil of 4-6 wk. The only metabolite identified was monomethyl chlortoluron, half-life 8 wk. 3-Chloro-4- methylphenylurea had a similar half-life but was not detected in soils treated with chlorotoluron or monomethyl chlortoluron suggesting that 3-chloro-4-methylaniline was formed directly from monomethyl chlortoluron. This aniline had a half-life of 1-2 days in soil, initial concentrations above 5 ppm yielding dimers and trimers predominantly C-N linked. Neither the aniline nor polymeric products were detected in chlortoluron treated soils, presumably because slow formation of the aniline was followed by rapid degradation which kept concentration low. (Author abstract by permission)

79-0216. Marsh, J. A. P.; Davies, H. A. (Agric. Res. Coun., Weed Res. Org., Yarnton, Oxford OX5 1PF, England) **The effect of herbicides on respiration and transformation of nitrogen in two soils. III. Lenacil, terbacil, chlorthiamid and 2,4,5-T.** *Weed Res.* 18(1): 57-62; 1978. (9 references)

The effects of lenacil, terbacil, chlorthiamid and 2,4,5-T at 100 ppm on carbon dioxide evolution, oxygen uptake and nitrogen transformation in two soils have been investigated for several months in the laboratory. The herbicides had no effect on CO_2 output from either Boddington Barn soil (organic carbon content 1.6% pH 6.1) or Triangle soil (organic carbon content 3.7% pH 4.8) apart from 2,4,5-T which reduced it sometimes. All the herbicides caused temporary reductions in O_2 uptake, but in Triangle soil treated with 2,4,5-T a significant reduction was observed during the second half of the incubation. 2,4,5-T and to a lesser extent chlorthiamid, reduced nitrification in Triangle soil. All the herbicides slightly increased mineralization of nitrogen except 2,4,5-T which had variable effects in Triangle soil. (Author abstract by permission)

79-0217. Meiniel, R. (Lab. Biol. Anim., Univ. Clermont, CNRA No. 408, Aubiere, France) **Teratogenie des anomalies axiales induites par un insecticide organophosphore (le parathion) chez l'embryon d'oiseaux. [Teratogenesis of axial abnormalities induced by an organophorphorus insecticide (parathion) in the avian embryo.]** *Wilhelm Roux Arch. Dev. Biol.* 18.(1): 41-63; 1977. (63 references) (French)

Parathion was applied to chicken or quail eggs by immersion, intravitelline injection or intrallantoid injection. When parathion exposure was conducted before incubation or at the beginning of development (after 48 hr incubation) specific axial deformities were induced. The anomalies become apparent after 4 - 5 days in the chick embryo and after 5 days of incubation in the quail. Morphologically, the teratogenic effects first become apparent via myotome compressions and notochordal and neural tube distortions. Development of the abnormalities is rapid in the chick embryo and slower in the quail embryo. Somites and primitive vertebrae undergo normal differentiation in the two species; the perinotochordal cells differentiate into chondroblast in apparently normal fashion. However, chondrogenesis later extends to the intervertebral clefts and gives rise to the formation of an unsegmented vertebral column. In the quail, vertebral fusions are encountered in regions where no torsion occurs. Cervical malformations can develop in quail and chick embryos when parathion is injected at late stages (second and last trimester of embryonic life). In such cases the axial deformities are morphologically similar to those observed after early treatment. In chick embryos after 16 days of incubation cervical scoliosis develops in 5 hr after treatment. The rapid occurrence of this malformation and the results obtained after early treatment support the previously proposed hypothesis that the disturbed morphogenesis is largely due to abnormal physiology or differentiation of the muscles.

79-0218. Bahiga, L. M.; Kotb, N. A.; El-Dessoukey, E. A.* (Natl. Res. Cent. Dokki, Cairo, Egypt) **Neurological syndromes produced by some toxic metals encountered industrially or environmentally.** *Z. Ernaehrungswiss.* 17(2): 84-88; 1978. (16 references)

A review of various pesticides and other chemicals which cause neurological damage upon exposure is presented. Accidental exposure to compounds containing arsenic causes a number of deaths each year. The gastrointestinal symptoms appear within 6 hr of exposure, with peripheral neuropathy developing 1-3 wk later. Organophosphates, such as DFP and tri-*o*-cresyl phosphate, give acute anticholinesterase effects; headaches, abdominal pains, vomiting, sweating, miosis, muscular twitchings and convulsions. Neurotoxic organophosphates also produce different and delayed neurological effects. Although atropine can be used for immediate poisoning relief, no antidotes for delayed neurotoxic effects are known. Organophosphate poisoning contributes to both peripheral nerve and spinal cord damage. Cerebellar disturbances resulting from exposure to organic mercury compounds is also considered.

See also 79-0037, 79-0063, 79-0088 *and* 79-0227.

79-0219. Limouzin, Y.; Maire, J. C. (Lab. Organometal., Univ. Droit Econ. & Sci., F-13397 Marseille 4, France) **Photoelectron spectroscopy as a tool in organotin chemistry.** *Adv. Chem. Ser.* 157: 227-248; 1978. (26 references)

A review of x-ray and UV-photoelectron spectroscopy techniques used in organotin chemistry is presented. Chemical shift sensitivity of tin core levels are discussed. The uses of x-ray PES and Mossbauer spectroscopy for determining charge distribution, oxidation states and coordination changes are described. New results in relation to organotin toxicity are reported with respect to the complexing of amino acids with Bu_3SnCl. Ring strain in cyclostannes have been studied with UV-PES, establishing the C-Sn-C angle is the largest in dimethylstannocyclohexane. Nuclear quadrupole resonance and UV-PES have been used to examine the bonding in aromatic organotin compounds, establishing a correlation between the first ionization potential and tetraalkylatin toxicity. Appendices list all published data on experimental binding energies and UV-photoelectron spectroscopy of organotin compounds.

79-0220. Giang, P. A. (Anal. Chem. Lab., Agric. Environ. Qual. Inst., USDA, Beltsville, MD 20705) **A bibliography on the use of infrared spectrophotometry in pesticides and pesticide residue studies.** *Agric. Res. Serv.* NE-91, 95 p.; 1978. (855 references)

A bibliography was compiled from scientific journal articles and books published up to 1976, used in a pesticide analytical laboratory. An attempt was made to include references on all the different and related analytical methods of infrared spectrophotometry, including combination methods, attenuated total reflection spectrometry, Raman spectrometry, and interferometry. Some general references on infrared spectrometry which may be of interest to pesticide chemists are also included. The references are labeled according to the subject matter covered, which may be a type of pesticide or general infrared technique.

79-0221. Yuen, S. H. (Pollock & Pool. LTD, Reading RG 54DX, England) **Determination of the rodenticides difenacoum and brodifacoum in finished baits by reversed-phase liquid chromatography.** *Analyst (London)* 103(1229): 842-850; 1978. (8 references)

A specific method is described for the analysis of 0.005% difenacoum and brodifacoum baits with an error of less than 10%. The method involves maceration of 50 g of sample in methanol - formic acid (50 + 1) and clean-up by column chromatography on Florisil - silica gel. The dichloromethane- methanol solution of the residue, with 1,3,5-triphenylbenzene as internal standard, is injected into a liquid chromatograph, equppped with a 10-cm Partisil-5 ODS column and an ultraviolet detector set at 254 nm, methanol- water - glacial acetic acid (90 + 10 + 0.8) being used as the mobile phase at ambient temperature. The method is also applicable to technical difenacoum and brodifacoum, and to 0.1-10% liquid and powder concentrates, with simpler procedures for preparing the test solutions. A thin-layer chromatographic method, using silica gel GF_{254} and 1,4-dioxan - light petroleum (boiling range 80-100°C) (3 + 7) as the developing solvent, was found to be adequate for establishing the relative purity of technical samples. Two major impurities were identified. (Author abstract by permission)

79-0222. Tanaka, A.; Nose, N.; Suzuki, T.; Hirose, A.; Watanabe, A. (Saitama Inst. Public Health, Saitama, Japan) **Application of an improved steam distillation procedure in residue analysis.** *Analyst (London)* 103(1229): 851-855; 1978. (19 references)

An improved steam distillation method for the separation of biphenyl and 2-phenylphenol from citrus fruits is described. The method involves the steam distillation of both fungicides from citrus fruits into a non-alkaline trap for the collection of biphenyl and into three alkaline traps for the collection of 2-phenylphenol. After distillation, the heptane extract is directly analyzed for biphenyl by means of gas - liquid chromatography with flame-ionization detection and the alkaline solution is analyzed for 2-phenylphenol by means of gas-liquid chromatography with electron-capture detection after pentafluoro benzoylation and extraction with heptane. This method of stream distillation gives satisfactory clean-up from essential oils and the limit of detection of the method is 1.25 ppm for biphenyl and 0.13 ppm for 2-phenylphenol. Recoveries of biphenyl and 2-phenylphenol from lemon, orange and grapefruit were satisfactory. (Author abstract by permission)

79-0223. Singhal, J. P.; Khan, S.; Bansal, O. P. (Chem. Sec., Fac. Engn. & Technol., Aligarh Muslim Univ., Aligarh 202001, India) **Titrimetric method for the determination of oxamyl residues in crops and soils.** *Analyst (London)* 103(1229): 872-875; 1978. (6 references)

A simple and reproducible method for the determination of oxamyl residues in crops and soils was devised. Previous methods required expensive instrumentation and were applicable for only limited ranges of oxamyl concentrations. The procedure described in this paper was carried out on samples of soils, tomatoes, tobacco leaves, potatoes and wheat. The samples were fortified with various amounts of oxamyl, and after standing overnight were extracted with ethyl acetate and the extracts were filtered. The filtrate was heated to remove the ethyl acetate, and then washed with hexane to remove impurities. The remaining solution was shaken with carbon disulphide and an alkaline solution of copper (II) sulphate, causing the oxamyl to precipitate out. Titration of the filtrate with EDTA yielded the amount of copper left in the solution, and this value can be used to calculate the amount of oxamyl residue in the sample. The average recovery varied from 85.5% to 100.8%, which is nearly the same as had been obtained by use of the spectrophotometric method.

79-0224. Shadoff, L. A.; Blaser, W. W.; Kocher, C. W.; Fravel, H. G. (Anal. Lab., Dow Chem. Co., Midland, MI

48640) **Chlorinated benzyl phenyl ethers: a possible interference in the determination of chlorinated dibenzo- *p*-dioxins in 2,4,5- trichlorophenol and its derivatives.** *Anal. Chem.* 50(11): 1586-1588; 1978. (3 references)

During the column chromatographic preparation and subsequent analysis by GC-MS techniques of samples for the determination of chlorinated dibenzo-*p*- dioxins present in 2,4,5-trichlorophenol and its derivatives, (2,4,5-T) other peaks are noted in the mass spectrum output which may cause some confusion. These other peaks are in the TCDD retention time region with the correct isotope ratios for tetrachloro compounds. To identify these other compounds, a highly concentrated extract of 2,4,5-trichlorophenol neutral components was prepared and analyzed. A mass spectra consistent with a series of polychlorinated benzyl phenyl ethers was noted. One of the substances identified was 2,6-dichloro benzyl- 2,4,5-trichlorophenyl ether. The elution time for this compound is slightly later than 2,3,7,8-TCDD. It yields a response at m/e 320, 322, and 324 and may be mistaken for a TCDD isomer in cases where only the molecular ion of TCDD is monitored.

79-0225. Antoine, O.; Van Hiel, K.; Mees, G. (Inst. Natl. Rech. Vet., B-1180 Brusseles, Belgium) **Test de routine pour le determination des insecticides organochlores par la chromatographie en couche mince at la chromatographie gazeuse. [Routine test for organochlorine insecticide determination using thin-layer chromatography and gas chromatography.]** *Ann. Med. Vet.* 121(1): 43-54; 1977. (9 references) (French)

A thin-layer chromatographic procedure is described permitting the qualitative identification of 31 organochlorine insecticides from a maximum of 4 chromatograms by the use of silica gel, aluminum oxide and microcrystalline cellulose as thin-layer absorbents. Seven solvent systems (xylene, hexanemethanol, ethyl acetate dichloromethane, petrol ether liquid paraffin, hexane acetone, hexane methanol, cyclohexane ethanol, and petrol ether liquid paraffin plus methanol water) are used for the chromatographic separation of the pesticides. UV absorption at 254 nm and silver nitrate as a chromogenic spray are used for identification of the pesticides. The R*f* values of the 31 reference pesticides, indicating the solvent system used, migration times and retention times and the R *f* values of compounded pesticides containing Kelthane (dicofol), BHC, chlordane, toxaphene and Strobane (terpene polychlorinates) are tabulated. The results were compared with gas chromatography and the reliability of the method was confirmed.

79-0226. Ragab, M. T. H. (Res. Stn., Agric. Canada, Kentville, Nova Scotia B4N 1J5, Canada) **Thin-layer chromatographic detection of glyphosphate herbicide (*N*-phosphonomethyl glycine) and its aminomethyl phosphonic acid metabolate.** *Chemosphere* 7(2): 143-154; 1978. (14 references)

A one-dimensional thin-layer chromatographic method is used for analysis of the herbicide glyphosphate and its major soil metabolite (amino methylphosphonic acid). The method uses microcrystalline cellulose plates or precoated MN-cellulose 300 sheets. A methanol-water solvent system is improved by the addition of sodium chloride, improving the chromatographic characteristics and resolution. Visualizing agents were ninhydrin, ninhydrin-copper nitrate, or ninhydrin- Rhodamine B. The sensitivity of the procedure allows the detection of approximately 100 ng glyphosate and 50 ng of its metabolite. The procedure is applicable to spiked water samples.

79-0227. Pomerantz, I.; Burke, J.; Firestone, D.; McKinney, J.; Roach, J.; Trotter, W. (Off. Drinking Water, US EPA, Washington, DC 20460) **Chemistry of PCBs and PBBs.** *Environ. Health Perspect.* 24: 133-146; 1978. (115 references)

Areas of concern in chlorobiphenyl and bromobiphenyl chemistry are reviewed. Agents encountered in the environment are considered along with their nonmetabolic alterations made on the halogenated biphenyl structure. Changes which are found in the chemical reactions between environmental agents and the chlorinated vs brominated biphenyls are noted. Analytical methodology for detection and determination of PCB and PBB residues in food are discussed. Problems associated with separation of PCB and DDE samples, as well as contamination of pesticidal mixtures (such as hexachlorobenzene and PCP) with chlorinated dibenzofurans are noted. Toxicity studies are reviewed with regard to contamination of foodstuffs by these compounds.

79-0228. Flessas, E.; Langner, H. J.; Sinell, H. J. (Inst. Lebensmittelhyg. Fleischhyg. & Technol., Frie Univ. Berlin, Berlin, Germany) **Zur Analytik von chlorierten Kohlen wasserstoff- pestiziden in Lebensmitteln tierischer Herkunft. [The analysis of chlorinated hydrocarbon pesticides in food of animal origin.]** *Fleischwirtschaft* 58(5): 871-75; 1978. (6 references) (German)

A gas chromatographic method is described for determining chlorinated hydrocarbons in foods of animal origin. The procedure involves homogenization of the sample, Soxhlet extraction of fat, clean-up by column chromatography, gas chromatographic separation, and identification and evaluation of individual pesticides. Due to optimization of every analytical step, standardization is greater and the method is more economical than other methods. The following recovery rates are noted: HCB (hexachlorobenzene), 98.4%; α-HCH (α-BHC), 95.3%; γ-HCH (lindane), 101.2%; β -HCH (β-BHC), 94.7%; HE (heptachlor epoxide), 96.8%; *o,p'*-DDT, 92.2%; dieldrin 91.4%; *p,p'*-DDD (TDE), 98.9%; and *p,p'*-DDT, 97.6%.

79-0229. Cohen, S. Z.; Zweig, G.; Law, M.; Wright, D.; Bontoyan, W. R. (US EPA, Washington, DC) **Analytical determination of *N*-nitroso compounds in pesticides by the United States Environmental Protection Agency - a preliminary study.** *IARC Sci. Publ.* 19: 333-342; 1978. (16 references)

Studies are reported on various pesticides which are suspected of containing *N*-nitroso compounds as contaminants. Three routes of possible *N*-nitroso contamination include: formation of the *N*-nitroso compounds during manufacture of the desired products; nitrosation occurring within the container carrying the compound, and the use of contaminanted amines in the manufacturing process. Of 25 pesticides analyzed thus far, 8 contained nitrosamines at or above the limit of sensitivity of the detection methods employed. Four of these eight samples are dinitroaniline-type compounds. Thus it appears that in general, the dinitroanilines contain *N*-nitroso impurities. In these cases the impurities would have arisen due to the first type of possible contamination mentioned above; potential *N*-nitroso contamination from production processes. Very few of the amine salts of the phenoxy and benzoic acid types have been shown contaminated. Most triazines appear to be free of *N*-nitroso contamination.

79-0230. Churchill, F. C., II; Ku, D. N.; Miles, J. W. (Cent. Dis. Control, PHS, DHEW, Atlanta, GA 30333) **Gas-liquid chromatographic inlet block derivatization of organophosphorus pesticides and related dialkyl phosphorothioates.** *J. Agric. Food Chem.* 26(5): 1108-1112; 1978. (16 references)

Trimethylphenyl ammonium hydroxide in methanol is demonstrated to be a useful reagent for the inlet block (in-block) GLC derivatization and subsequent quantification of not only many organophosphorus pesticides but also their dialkyl phosphorothioate hydrolysis products. Methyl parathion is shown to derivatize in high yield by an in-block trans esterification mechanism, while malathion reacts by rapid β-elimination in solution, followed by in-block pyrolytic methylation. Efficiencies are determined for the methylation of potassium *O,O*-dimethyl phosphoro dithioate and potassium *O,O*-dimethyl phosphoro thioate and methods for the quantification of these salts are outlined. (Author abstract reprinted by permission of American Chemical Society)

79-0231. Lamparski, L. L.; Mahle, N. H.; Shadoff, L. A. (Anal. Lab., Dow Chem. USA, Midland, MI 48640) **Determination of pentachlorophenol, hexachloro- dibenzo- *p*-dioxin, and octachloro- dibenzo- *p*-dioxin in bovine milk.** *J. Agric. Food Chem.* 26(5): 1113-1116; 1978. (21 references)

Methods are described for determining pentachlorophenol (PCP), hexachlorodibenzo- *p*-dioxin (HCDD), octachlorodibenzo-*p*- dioxin (OCDD) in bovine milk. The PCP method consists of sulfuric acid digestion, silica gel column chromatography, methylation, alumina column chromatography, and detection with electron capture-gas chromatography (EC-GC). The chlordioxin procedure consists of extraction from basic solution, acid wash, silica gel and alumina column chromatography, and detection by EC-GC and/or gas chromatography mass spectrometry (GC-MS). Recoveries for PCP, HCDD, and OCDD were 80, 80, and 100%, respectively. Samples of some quarantined milk from the state of Michigan gave no detectable signal for PCP, HCDD, and OCDD at the detection limits of 10-15, 0.025, and 0.05 ppb, respectively. (Author abstract reprinted by permission of the American Chemical Society)

79-0232. Marvel, J. T.; Brightwell, B. B.; Malik, J. M.; Sutherland, M. L.; Reuppel, M. L.* (Agric. Res. Dep., Monsanto Co., St. Louis, MO 63166) **A simple apparatus and quantitative method for determining the persistance of pesticides in soil.** *J. Agric. Food Chem.* 26(5): 1116-1120; 1978. (18 references)

A simple, noncumbersome apparatus and full supporting methodologies have been developed for quantitative studies on the rate and extent of degradation of ^{14}C-labeled pesticides in soil under aerobic conditions. Evolved $^{14}CO_2$ is monitored periodically using interchangeable Drierite- Ascarite- polyurethane towers with analysis by liquid scintillation counting after release of $^{14}CO_2$ from Ascarite with acid and retrapping. Aerobic conditions are maintained by diffusion through the tower while volatile organics are trapped in the polyurethane plug. Using multiple incubation flasks with a given soil and ^{14}C pesticide, the rate of degradation can be determined by periodic analysis of a whole flask. The overall accountability of the radioactivity using this methodology is nearly quantitative as shown by control experiments and by the results of many aerobic metabolism studies. (Author abstract reprinted by permission of the American Chemical Society)

79-0233. Wright, F. C.; Riner, J. C. (Livestock Insects Lab., Sci. & Educ. Adm., USDA, Kerrville, TX 78028) **Method to determine fenthion and five oxidative metabolites in fat.** *J. Agric. Food Chem.* 26(5): 1258-1259; 1978. (5 references)

A method was modified for determining fenthion (*O,O*-dimethyl *O*- [3-methyl- 4-(methylthio) phenyl]- phosphoro thioate) and five oxidative metabolites in fat. With this method, fenthion, its sulfoxide, its sulfone, and the oxygen analogue, and its sulfone were analyzed by gas chromatography with the flame photometric detector and a 3% OV-1 column. The oxygen analogue sulfoxide was analyzed by liquid chromatography with a μ Bondapak C 18 column. Recoveries from samples of fat fortified with the compounds were in the range of 81-100%. (Author abstract reprinted by permission of the American Chemical Society)

79-0234. Lores, E. M.; Bristol, D. W.; Moseman, R. F. (Anal. Chem. Branch, Health Effects Res. Lab., US EPA, Research Triangle Park, NC 27711) **Determination of halogenated anilines and related compounds by HPLC with electrochemical and UV detection.** *J. Chromatogr. Sci.* 16(8): 358-362; 1978. (5 references)

A rapid, simple separation procedure for a complex group of halogenated anilines is described. The procedure uses high-pressure liquid chromatography with solvent programming and ultraviolet detection. A more sensitive but also more complex method based on the use of an electrochemical detector is also described. Sub-nanogram quantities are de-

tectable, using an inexpensive electrochemical detector. Chromatograms and sensitivity data for various compounds are listed including aniline, 2-amino- 4-chlorophenol, *p*-chloroaniline, *p*-bromoanaline, *m*-chloroaniline, *o*-chloroaniline, and 3,4-dichloroaniline. As halogenated anilines may enter the environment from various sources, including the metabolism of insecticides, such methods are of importance in environmental protection.

79-0235. Lott, P. F.; Lott, J. W.; Doms, D. J. (Chem. Dep., Univ. Missouri, Kansas City, MO 64110) **The determination of paraquat.** *J. Chromatogr. Sci.* 16(9): 390-395; 1978. (24 references)

Various methods which are used for the determination of paraquat are reviewed. For the determination of paraquat on food stuffs, crop residues, soil, water and in body fluids, colorimetric methods are suggested. Paraquat has also been determined by high-pressure liquid chromatography, gas liquid chromatography, and thin layer chromatographic procedures. In general the thin layer method has been the least satisfactory due to the fact that the quaternary compounds are not extracted by organic solvents and remain in the aqueous extract after acidic and basic compounds have been removed. A procedure for the high-pressure liquid chromatographic determination of paraquat in urine is described. A gas chromatographic method for determinations in water is discussed; this involves the catalytic hydrogenation of paraquat dichloride to 1,1′-dimethyl- 4,4′-bipiperidine. A screening test for the detection of paraquat on marihuana samples is also discussed. The test involves maceration of the sample with water followed by testing with 2% sodium dithionite in 2 *N* NaOH.

79-0236. Davies, R. D.; Pretorius, V. (Inst. Chromatogr., Univ. Pretoria, Pretoria, South Africa) **Fluorescence of pesticides on silica gel thin-layer plates by use of a gaseous electrical discharge technique.** *J. Chromatogr.* 155(1): 229-232; 1978. (10 references)

The effects of the electrical discharge technique in selectively lowering detection limits on a wide range of pesticides is reported. Pesticides studies included diuron, atrazine, picloram, γ-BHC (lindane), endosulfan, *p,p′*-DDT, PCP, monocrotophos, dimethoate, fenitrothion, diazinon, propoxur, methyl gusathion, and Perthane. The electrical discharge technique is extremely simple; 4 min in electrical discharge chamber, 8 min in 130°C forced draft oven, and 12 min under 350 nm UV radiation. The method has application to a wide range of pesticides. Its uniformity compares with methods employing various spray reagents. Use of a single spray application prior to heating has improved detection limits in some cases.

79-0237. Chiba, M. (Res. Stn., Agric. Canada, Vineland Station, Ontario LOR 2EO, Canada.) **A gas chromatographic determination of permethrin isomers on peach foliage.** *J. Environ. Sci. Health B* 13(3): 261-268; 1978. (8 references)

A simple gas chromatographic method is explained for the individual determination of *cis* and *trans* isomers of permethrin and the studies on the dissipation of the two isomers on peach leaves after spray applications in an orchard are included. Permethrin was applied at 0.21 kg AI/ha as a 25% wettable powder formulation to peach trees in early June and again in mid-July. The formulation included both isomers in the ratio of *cis* 40: *trans* 60. At days 0, 3, 7, 10, 14, and 21 after application, samples were taken from the leaves of the trees. The method called for extraction with benzene and analysis without clean-up procedures. A glass column packed with 5% QF-1 on Gas Chrom Q gave good separation of the *cis* and *trans* isomers with the lowest detectable amount being 30 pg with a tritium electron capture detector. The initial deposits on the leaves were 6 to 10 ppm. Both isomers dissipated at about the same rate. At 21 days after application, about 10% and 41% of the initial deposits were present in June and July, respectively.

79-0238. Grover, R.; Kerr, L. A. (Res. Stn., Agric. Canada, Regina, Saskatchewan S4P 3A2, Canada) **Evaluation of silica gel and XAD-4 as adsorbents for herbicides in air.** *J. Environ. Sci. Health B* 13(3): 311-321; 1978. (25 references)

Sampling efficiencies and ease of extraction from silica gel and XAD-4 resin were compared for esters of *n*-butyl and iso-octyl esters of 2,4-D, *n*-butyl ester of 2,4,5-T, bromoxynil octanoate, triallate, and trifluralin. Both the silica gel and XAD-4 proved effective in adsorbing a variety of herbicide vapors in the air. However, silica gel offered several advantages, such as simpler and quicker extraction procedures for the phenoxy herbicides and better recoveries over the entire concentration range tested for most herbicides. Although XAD-4 resin was more effective at low vapor concentrations of triallate than silica gel, neither was effective at the lowest level of triallate vapor tested. These results indicate that both adsorbents offer simple and efficient means for extensive air monitoring of some of the more prevalent volatile herbicides.

79-0239. Dawson, V. K.; Harman, P. D.; Schultz, D. P.; Allen, J. L. (Fish Control Lab., US Fish & Wildl. Serv., La Crosse, WI 54601) **Rapid method for determining concentrations of Bayer 73 in water during lampricide treatments.** *J. Fish. Res. Board Can.* 35(9): 1262-1265; 1978. (7 references)

Two simple, rapid, sensitive methods were developed for determining the concentration of the lampricide diclosamide (Bayer 73) in stream water. Bayer 73 was extracted from acidified water samples with chloroform and then hydrolyzed to 2-chloro- 4-nitroaniline (CNA) with either acid or base. The CNA was diazotized with sodium nitrite, and an azo dye was formed with either *N*-(1-naphthyl) ethylenediamine dihydrochloride (after acid hydrolysis) or 1-naphthol (after base hydrolysis). There was no interference from the lampricide 3-trifluoromethyl- 4-nitrophenol (TFM) in either method. Standard curves were prepared with untreated water to compensate for interfering substances that occurred naturally in some streams. The methods were sensitive to about 0.005 mg/l (ppm). Time required for analysis

of sample ranged from 25 min to 1 hr. (Author abstract by permission)

79-0240. Albro, P. (NIEHS, Research Triangle Park, NC) **Problems of sample handling, extraction and clean-up.** *N. Y. Acad. Sci., Sci. Week* June 21-30:; 1978.

Some problems in pesticide sample handling, extraction, and clean-up are reviewed. Procedures that are effective for extraction and clean-up of one type of sample matrix are not always proven effective for another. The lack of demonstrating consistent recovery of "spiked" samples as a means for determining efficiency of recovery of endogenous compounds is described as possibly the most serious problem area. These factors contribute to the uncertainty in residue analysis.

79-0241. Hass, J. R.; Friesen, M. D. (NIEHS, Research Triangle Park, NC) **Qualitative and quantitative methods for dioxin analysis.** *N. Y. Acad. Sci., Sci. Week* June 21-30:; 1978.

A review of the methods used in dioxin analysis is outlined. Combined gas chromatography and mass spectrometry (GC/MS) at low resolution, then reanalysis at high resolution for samples with positive results is a widely used screening method. Two areas of improvement are suggested: increased specificity of screening methods and the use of negative ion, chemical ionization, mass spectrometry instead of electron impact ionization. The authors argue that fewer false positive results will occur by using the methods described.

79-0242. Fuhr, F. (Radioagron. Work. Grp., Atom. Res. Cent., Julich GmbH, D-5170 Julich, Germany) **The use of tracer techniques in pesticide balance and metabolism studies.** *J. Nucl. Agric. Biol.* 6(4): 134-137; 1977. (15 references)

A radioisotope technique, using ^{14}C-labeled pesticides, has become a useful tool in obtaining information on the fate of pesticides in the soil plant system. This technique allows the pesticide to be traced through its uptake, transport, and metabolism by the plant; the photochemical, chemical, and microbial degradation; the adsorption-desorption and translocation in soils; and availability to untreated crops. A pesticide study under field conditions using the radio labeling technique can examine most of the factors affecting the fate of the compounds and determine the major processes involved in the breakdown. The use of tracer techniques in specific studies in examined.

79-0243. Baker, H. J.; Courtney, G. F. (Biol. & Chem. Res. Inst., New South Wales Dep. Agric., Rydalmere, NSW, Australia) **A rapid analytical method for the detection of hexachlorobenzene contamination in agricultural chemicals.** *Pestic. Sci.* 9(3): 202-206; 1978. (13 references)

A rapid screening method was developed for detection of low level (0.1 mg/kg) hexachlorobenzene contamination in agricultural chemicals. Chemical samples including chlordane, heptachlor, camphechlor, toxaphene and aldrin, were dissolved in hexane or acetone and a portion was treated with 0.02 μg/ml hexachlorobenzene. The original sample and the treated portions were spotted onto silica gel F_{254} alluminium plates and two-way developed in hexane. To achieve absolute clean-up, gas-liquid chromatography was used. The use of progressive elimination of gross amounts of unwanted chemical substerates by this method is successful for rapid detection of agricultural chemical contamination. It is suggested that the developing solvent have a greater R *f* than the parent chemical. The chemicals noted above were examined at the 1 mg/kg level.

79-0244. Krishnakumari, M. K.; Bai, K. M.; Majumder, S. K. (Infest. Control & Pestic., Cent. Food Technol. Res. Inst., Mysore 570013, India) **Culturing *Ariophanta madraspatana* (Gray) in the laboratory for pesticide bioassay.** *Proc. Indian Acad. Sci. Sect. B* 87(6): 137-144; 1978. (9 references)

A study was made to ascertain optimum reproducible conditions to maintain and breed garden snails in the laboratory for subsequent use in bioassays of pesticides. The results of this study suggest that snails can be maintained and reared well in wooden terrariums measuring 54x44x30 m with a gravel-soil-leaf medium kept between pH 7 and 9. Temperature should be maintained between 22 and 28°C with 65-75% humidity. Germinated greengram was a preferred food. Reproduction of the snails was successful under these conditions and the resulting population was homogeneous and well suited for bioassay of pesticides.

79-0245. Iida, K.; Watanabe, S.; Ikeda, H. (Kanagawa Pref. Publ. Health Lab., Yokohama, Kanagawa, Japan) **Residue analysis of vegetables for chlorophenols.** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jpn.)* 19(4): 372-377; 1978. (13 references) (Japanese)

Investigations of the presence of chlorophenols, the primary degradation products of several agricultural pesticides, in 9 agricultural products; carrot, Japanese radish, cabbage, cucumber, summer orange, water melon, tomato, egg-plant and raw tea-leaf, are described. Chlorophenols were extracted by an improved apparatus for determining essential oils and the extract was acetylated by a simple method. Chlorophenol detection limits for 2,4-dichlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol and 2,3,4,6-tetra chlorophenol were at levels of 0.004, 0.002, 0.002 and 0.001 ppm, respectively. It is considered that these chlorophenols are not present in these agricultural crops; they may have been further degraded or may have polymerized. Because of the possible interrelationships between other agricultural pesticides further investigation will be necessary.

79-0246. Bach, P. H.; Wingfield, E. S.; Leary, W. P.; Bach, F.; Turner, H. (Dep. Clin. & Exp. Pharmacol., Univ. Natal, Durban, South Africa) **Assessment of a diagnostic dip-stick for assaying plasma or serum pseudocholinesterase activity.** *S. Afr. Med. J.* 54(3): 108-112; 1978. (8 references)

Plasma specimens from 42 pesticide workers were taken for regular monitoring to determine whether a new diagnostic dip-stick method might be useful for assessing occupational exposure to cholinesterase (ChE) inhibitors. The method is based on an earlier scheme in which filter paper, impregnated with pH indicator and acetylcholine, changes color in relation to the amount of acetic acid released, that is, the enzyme activity. The current method takes only 6 min to complete, irrespective of enzyme activity. By staggering at 30 sec intervals, as many as 12 dip-stick measurements can be made in 11 min. The cost is fractional compared with the spectrophotometric method. Results are reproducible.

79-0247. Rodriguez-Vazquez, J. A. (Dep. Quim., Collgio Univ., Vigo, Spain) **Gas-chromatographic determination of organomercury (II) compounds.** *Talanta* 25(6): 299-310; 1978. (99 references)

A review of the gas chromatographic methods for the determination of organomercury (II) compounds is presented. Such methods are invaluable in the identification and determination of such compounds, and are also used for differentiating inorganically bound from organically bound mercury. The determination of various inorganic species can be made through their conversion to organomercury (II) compounds and subsequent identification by gas chromatographic means. Applications of gas chromatography to different biological and environmental matrices for the identification and differentiation of methylmercuric chloride from other organomercury compounds is discussed. General considerations reviewed include thermal stability of the compounds, and the specifications for columns and detectors. The chemical and instrumental problems associated with the various gas chromatographic methods are delineated.

79-0248. Trondina, G. A. (All-Union Exp. Vet. Inst., Moscow, USSR) **Metod razdel'nogo opredeleniya ftalofosa i fozalona y rybe i vode. [Method for the separation determination of phthalophos and phosalone in fish and water.]** *Veterinariya (Moscow)* (6): 96-98; 1978. (Russian)

Thin-layer chromatographic method for the determination of phthalophos (phosmet) and phosalone in water and fish is described. Following extraction with chloroform from water, and with *n*-hexane from fish, the extracts are purified on silica gel column, using petroleum ether: acetone (9:1) for elution. The pesticides are separated on Silufol or silica gel plate, using chloroform: benzene (2:1) as a solvent system. The plate is sprayed with bromophenol blue and then with 1% citric acid for visualization. The R*f* value of phthalophos on Silufol plates is 0.63 ± 0.05, that of phosalone 0.83 ± 0.05. On silica gel plate, the R*f* values of phthalophos and phosalone are 0.4 ± 0.05 and 0.6 ± 0.05, respectively. To identify phosalone on Silufol plates, 4-aminoantipyrine should also be used for visualization. On Silufol plate, the sensitivity amounts to 0.025 mg/kg in fish, and 0.005 mg/l in water. The recovery rates are 80 ± 5% in fish, and 90 ± 7% in water.

79-0249. Lefebvre-Drouet, E.; Calvet, R. (Stn. Sci. Sol., Inst. Rech. Agron., F-78000 Versailles, France) **La detection et le dosage des herbicides a l'aide des *Chlorelles*: rechereches sur les conditons experimentales optimales et application a l'analyse de plusieurs herbicides. [The detection and estimation of herbicides with the aid of *Chlorella*: optimum conditions and application to the analysis of several herbicides.]** *Weed Res.* 18(1): 33-39; 1978. (12 references) (French)

The use of a uniform culture of *Chlorella* as an inoculum at a given density under known conditions of temperature, light and nutrition in a gaseous mixture has allowed an improvement in the technique and given highly reproducible results. Tests with atrazine have shown that it can be detected at a dose of 0.012 ppm and estimated to an accuracy of 0.04 ppm. Other herbicides have been tested and their sensitivity was found to be in the following descending order: terbutryne > lenacil = isoproturon > atrazine > chlortoluron > metabenzthiazuron = metoxuron. (Author abstract by permission)

79-0250. Thielemann, H.; Grahneis, H. (Hyg. Inst., Martin Luther Univ., Halle-Wittenberg, DDR) **Semiquantitative dunnschicht chromatographische Bestimmung von Toxaphen im Bienehoig ein Beitrage zur Ruckstandsanalytik. [Semi-quantitative thin-layer chromatography determination of toxaphene in honey: a contribution to residue analysis.]** *Z. Gesamte Hyg. Ihre Grenzgeb.* 24(2): 139; 1978. (German)

A process for detecting residues of the insecticide toxaphene in honey is described. An extract of the honey is made with ethanol, acetone, sodium chloride, diethyl ether and *n*-hexane. The carrier solvent is a mixture of carbon tetrachloride: petroleum ether (60:40) and the developer is a silver nitrate solution. A minimum of 0.6 μg toxaphene is detectable optically, and 1 μg by semi-quantitative analysis. If DDT, DDE or HCH (BHC) are present, this procedure will need to be supplemented with ultraviolet spectroscopy or a more precise chromatography.

See also **79-0043** *and* **79-0057.**

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